

Flight

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

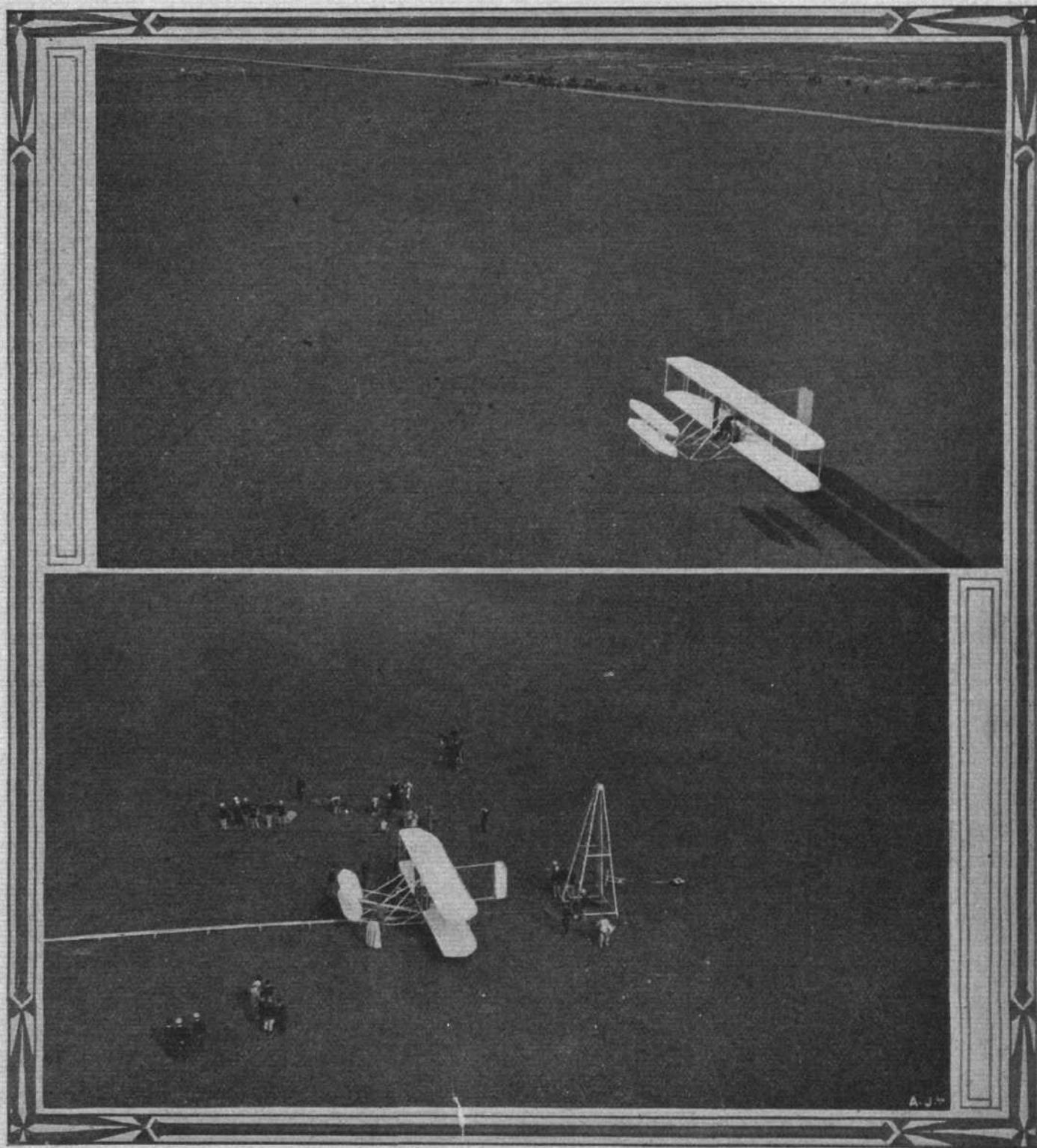
OFFICIAL ORGAN OF THE AERO CLUB OF THE UNITED KINGDOM.

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REMARKABLE PHOTOGRAPHS OF A WRIGHT FLYER TAKEN FROM A BALLOON.—In the lower picture the machine is ready at the derrick on the starting rail for the flight; and, in the upper photograph, the machine is in full flight, with two passengers on board. The majority of the watchers are military men, and, in the upper picture, in the distance, several visitors in their cars are noticeable watching the scene.

FRENCH TEARS AND A BRITISH MORAL.

THE newspaper reader of this country is not unaccustomed to the cry of "Wake up England!" in one connection or another, but we are none the less glad that the warning note should have been repeated so solemnly on Wednesday last by Lord Roberts at the Royal United Service Institution. Progress in regard to the navigation of the air in Germany and France has again and again been instanced to throw into greater prominence our own backwardness; but, as though to show how supremely urgent the question has become, we find that even France during this past week is becoming distinctly nervous at the steady advance in official military circles in Germany. If, therefore, the French feel that they have occasion for alarm, considering the encouragement that has been given by their Government, how much more important is it that the British Government should consider the position of this country, and should do its utmost to rise from the inferiority in which various circumstances have placed and held it. We ourselves, as the mouthpiece of British aviation, would always be the last to scare our readers unnecessarily, just as we should ever be the first to give credit to the British Government for such action as it has taken in the matter. In this connection it may be well at the outset to recall that there is at this moment in course of construction at the Barrow works of Messrs. Vickers, Son, and Maxim, one magnificent airship of the rigid type, in addition to the non-rigid Lebaudy and Clement ships that are likely to be acquired from France as a result of the *Morning Post* negotiations with the War Office; and that this mammoth vessel, with its pair of 8-cyl. 200-h.p. Wolseley motors, stands no small chance, in the hands that it is in, of proving the most efficient aerial craft afloat.

While British officialdom is doing what it is—totally inadequate though it may be—we cannot justly bring a charge of utter apathy against them as far as dirigible balloon work goes, even though we are fully justified in asking if the possession of only these two or three vessels is calculated to withstand Germany's present fleet. That fleet consists, by the way, of six Zeppelins, three Gross, and three Parsevals, which, if not individually superior, must together possess an enormous superiority over anything that this country can muster for some time. But say what we may on behalf of the Government, there is unfortunately no indication at all as yet that the claims of the aeroplane in its military application have been adequately considered, or that the authorities have taken any steps at all to commence the systematic training of any considerable body of men in readiness for the inevitable developments of the near future. Turning for the moment to France, we find that both sides of the question of military aeronautics are being given the most serious attention, and that the ultimate supersession of the dirigible by the aeroplane is taken for granted by all authorities, the latest move on the part of the Government being the purchase of four biplanes and two monoplanes of the leading types for the use of officers who are desirous of becoming practical aviators. Encouragement is thus to be given in every direction to induce officers to devote themselves to aviation as well as dirigible ballooning, and quite recently the Military Governor of Paris has issued a circular asking officers who are willing to take up this branch of work to send in their names to him. Information to this effect,

together with a further announcement that the Government would shortly submit a complete programme for material and construction to the Senate, was given by the Minister of War only a few days ago to a deputation of the Committees of the Senate and Chambers which waited upon him to express "the anxiety of members of their group at the progress made in other countries, especially Germany, while aerial navigation seemed to be stationary in France."

The attention which this matter is receiving in France has been largely brought to a definite focus by a most able report drawn up by M. Clémentel, in connection with the French War Budget, and in which he not only says, "Our aerial fleet, after having been the finest in the world, is now reduced to a single dirigible, already old and useless," but urges that "France must, at all costs, organise an aerial fleet equal to those of her neighbours." Thus it will be seen that France, with all her experience and enterprise, does not consider herself to be much better off in the matter of an aerial navy than Britain, which has scarcely done more than make the most tentative of experiments with any type of flyers. To remedy this position into which she has fallen, however, France has gone very thoroughly into the whole question, in a manner which ought to receive the closest attention of the British authorities and of all wide-awake British subjects; and M. Clémentel's report is a model of concise and comprehensive examination. In spite of the gigantic strides made by heavier-than-air apparatus, the steerable "gas-bag" is given by him twenty years of useful life, and M. Clémentel states that a vote of £20,000 is necessary in aid of military airships. On the other hand, it is interesting in this same connection to note that General Brun, the War Minister, only gives the dirigible four years in which to become obsolete, and he is consequently undisturbed by Germany's superiority in this particular respect. He, however, is even more impressed than M. Clémentel by the impending military utility of the aeroplane, and the necessity for energetic operations immediately to be instituted on an important scale.

When speaking of aeroplanes for military application, M. Clémentel claims that automatic stability by gyroscopic means has already been solved by the French War Office at their Chalais-Meudon establishment, and he further makes a great point that it is the imperative duty of the War Department to organise another large establishment, since he draws such a hard and fast distinction between military aeroplane construction and that which is required for civilian sport that he urges official manufacture as well as official encouragement of outside builders of aeroplanes.

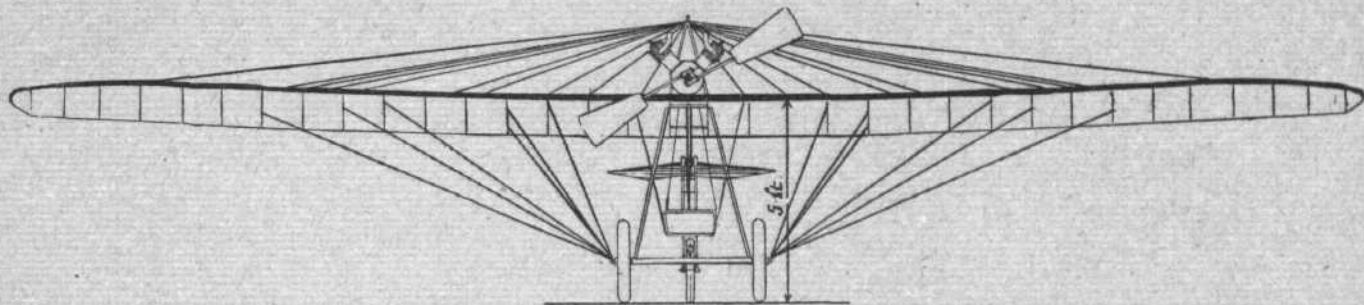
But interesting as this report unquestionably is, it is the moral of French activity with which we are concerned. Apart from the purchase of half-a-dozen aeroplanes, and the subsequent provision for building special war machines, M. Clémentel also insists upon the necessity for educating military aviators, and for giving them increased pay and other advantages in proportion to the risks they must run. This is yet another step in which Britain ought to emulate her neighbour at once, and it seems to us that we have—particularly with the assistance of Mr. Haldane's recently-introduced Territorial scheme—a unique opportunity which ought not to be allowed to slip.

THE GRADE MONOPLANE.

ALTHOUGH in Germany attention has been almost entirely directed to the development of dirigibles, yet the past year has produced one machine with which some very good results have been obtained. It is the invention of Herr Grade, an engineer of Berlin, who has been patiently working away at the problem for some considerable time. His first machine was a triplane, but as a result of his experiments, Herr Grade gradually modified his designs until the successful flyer was evolved in the form of a monoplane, which in silhouette combines several features of the Bleriot and Antoinette machines. Our readers will remember

accident, and that was due to the propeller breaking when the machine was flying at a height of 30 metres.

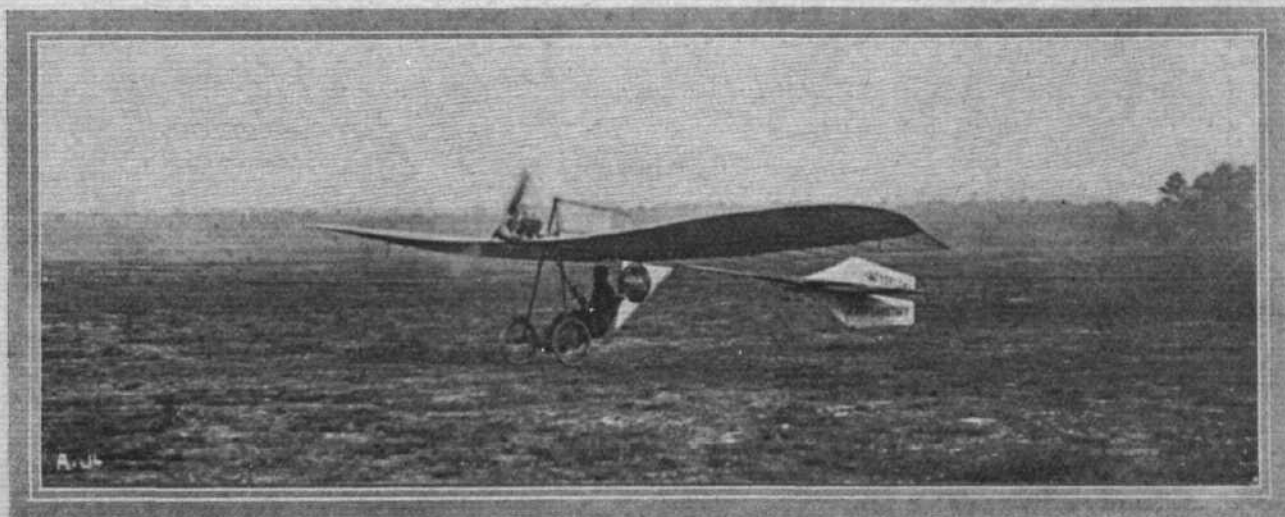
With regard to the machine itself, of which we are enabled to give scale drawings this week, it will be noticed that the planes are mounted on a framework built up of steel tubing and carried on three wheels, which are fitted with pneumatic tyres. This framework is remarkably simple, consisting as it does of the triangular front frame and the tube which forms the backbone of the apparatus. This latter member, as can be seen in the plan, is attached to the front frame by a forked end, and this fork carries the main-planes, and is also continued forward



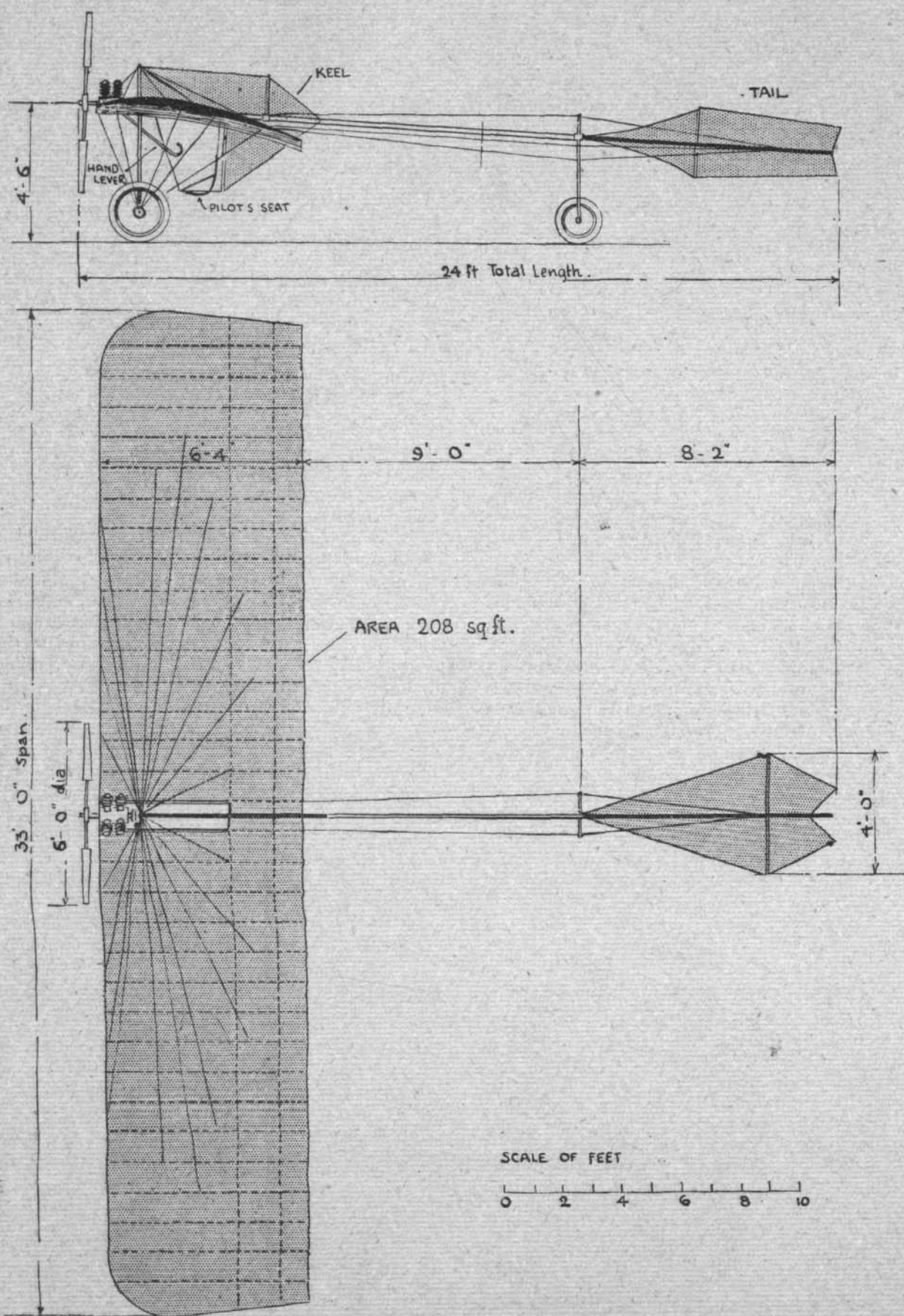
THE GRADE MONOPLANE.—Front elevation.

that Herr Grade's first success was obtained during the last few days of last year, when he was able to rise in his machine to an altitude of one metre and cover distances varying between 100 and 400 metres. After that followed a long period of patient experimenting with but little visible result, and it was not until the early part of last September that Herr Grade came prominently into public notice again. He transferred his monoplane to the Mars flying ground, to the south-west of Berlin, and made three short flights, each of a mile and a half in length. Then success followed rapidly, and Herr Grade has gradually improved his record until on November 15th he remained aloft for 54 minutes, during which he occasionally rose as high as 100 metres. One of his most notable performances was the winning of the Lanz prize of £2,000 for the first German-built aeroplane to describe a figure "8" round two posts placed a kilometre apart. This Herr Grade successfully accomplished on October 30th. Although he has had one or two tumbles Herr Grade has only experienced one serious

to serve as engine bearers. The main planes are strengthened by wire stays, of which those on the upper side meet at the apex of the vertical front-frame, while those on the under-side are attached to the hub-caps, on the Santos-Dumont method. Our photograph clearly shows the way in which the pilot sits below the main planes in a hammock seat suspended by springs from the framework. He controls the machine by warping the wings, by means of the hand lever, and by the tail, which is similar to that adopted by M. Santos Dumont on his little "Demoiselle." The flyer has an area of 208 square feet, and is fitted with a 4-cyl. air-cooled "V" motor, which is also the production of Herr Grade. This is of 24-h.p. and weighs 35 kilogs. The propeller is a two-bladed metal one, directly attached to the crank-shaft. A keel is fitted above the main plane and is continued behind the pilot's seat. That part of it on top of the machine is of inverted "V" section, as it follows the shape of the top portion of the front frame. Incidentally, therefore, it affords a covering for the pilot.



The Grade Monoplane.

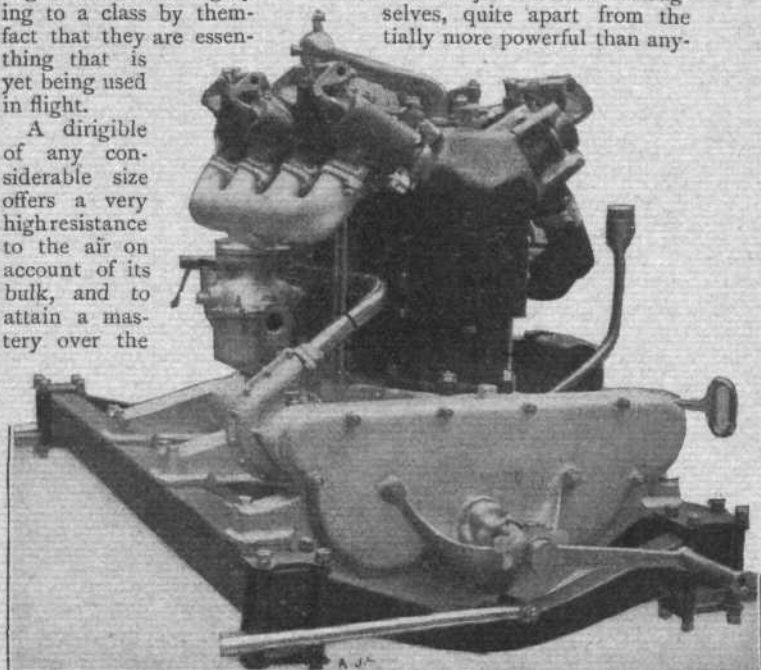


THE GRADE MONOPLANE.—Side Elevation and Plan to scale.

ENGINES FOR DIRIGIBLES.

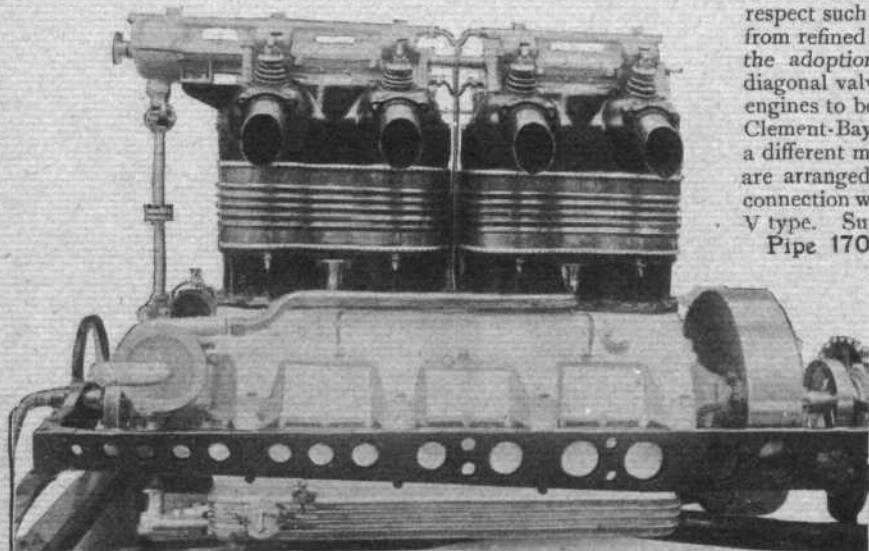
THAT department in engine design which is facing the problem of constructing engines for dirigibles, has to contend with a very different set of factors to those which beset the path of the builder of motors for use on aeroplanes. The airship, although still in its infancy, like the flyer, is advancing to the conquest of its element along quite different lines, and the demands which it makes on an engine are in consequence of a dissimilar character; where, in the engine for flight, light weight is, for temporary purposes at any rate, occasionally made the almost sole factor of importance, in the engines for a dirigible, reliability and efficiency are of paramount value from the first. Light weight is, and must ever remain, an important factor in connection with all aeronautical work, but while it is very often regarded as a means to an end in aviation, in the "lighter-than-air" school it can be looked upon more as a feature to be evolved in the fulness of time. The result of this is that the engines in this category ing to a class by themselves, quite apart from the fact that they are essentially more powerful than any-

A dirigible of any considerable size offers a very high resistance to the air on account of its bulk, and to attain a mastery over the



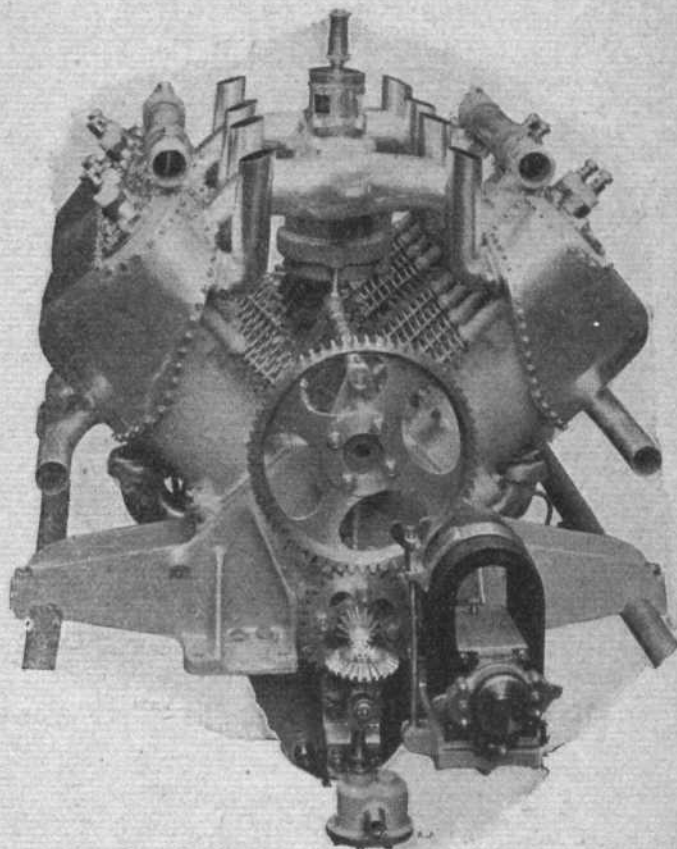
PARIS FLIGHT SHOW.—View of the 170-h.p. Pipe airship engine, showing the inclined valves. The method of suspending the engine frame on quarter-elliptic springs, and the use of radius-rods to prevent swaying, is also shown.

elements in even fair weather calls for high power. At present the range for such engines seems to be anything from 100 to 200-h.p. Fewer makers appear to be interesting themselves in the construction



PARIS FLIGHT SHOW.—View of the 200-h.p. Bayard-Clement airship engine, showing the overhead cam-shaft which operates the inclined valves.

of such motors, but among them is the Wolseley Co., who exhibit under the auspices of the Office d'Aviation, the 180-h.p. model which was familiar to the visitors of the Aero Show in London. Other prominent firms are Messrs. Panhard, Pipe, De Dion, and Bayard-Clement. One and all are building substantial high-powered



"Flight" Copyright Photo.

WOLSELEY AERO MOTOR.—End view, showing the gearing for the cam-shaft, magneto and oil-pump. The fastening of the aluminium water-jackets to the cylinders is a special detail of the construction prominently shown in the above illustration.

engines, and with the exception of the De Dion they are of the vertical type. Messrs. Wolseley and Bayard-Clement lighten their construction by the use of partial copper water-jackets, while Messrs. De Dion and Pipe employ aluminium pipes, but except in this respect such lightness as the engines possess is essentially derived from refined workmanship and high-class materials rather than by the adoption of novel features. Messrs. Pipe have found the diagonal valves they have for a long while used in their motor car engines to be admirably suited to their present work, and Messrs. Clement-Bayard also employ a somewhat similar arrangement with a different method of operation. In the Wolseley engine the valves are arranged at the side in the orthodox way, as also is the case in connection with the De Dion motor, which, however, belongs to the V type. Summarised details of these motors are given herewith.

Pipe 170-h.p. — Four-cylinder water-cooled vertical engine, having the cylinders cast in pairs. Steel pistons and steel rings are used. The valves are placed diagonally in the cylinder heads, after the standard Pipe practice on motor car engines. The crank-shaft is supported on three ball-bearings, and the engine as a whole is carried on a frame suspended by four quarter-elliptic springs arranged transversely at the corners. Adjustable radius-rods are fitted to prevent swaying, the outer ends of the springs being attached to shackles.

Dimensions.—160 mm. by 180 mm.; weight (with fly-wheel), 410 kilograms; h.p., 170 at 1,350 r.p.m.; price, 25,000 francs.

Clement-Bayard 200-h.p. — Four-cylinder water-cooled vertical engine, having its cylinders cast in pairs complete with the cylinder-heads

and part of the water-jacket. The remainder of the jacket is formed of corrugated sheet copper held down by steel bands fastened in place by screws. The valves are set diagonally in the cylinder-heads, and are operated by rock-levers from an overhead cam-shaft, which is driven by bevel-gearing from a vertical shaft in front of the engine. A transverse shaft, skew-gear driven from this vertical shaft, drives the magneto and the circulating-pump. Another vertical shaft is used to drive the oil-pump, which is situated outside the crank-chamber. The engine, as a complete unit, is mounted in a pressed-steel frame suspended on quarter-elliptic springs placed transversely at the corners.

Dimensions.—190 mm. by 230 mm.; weight, 500 kilogs.; h.p., 200.

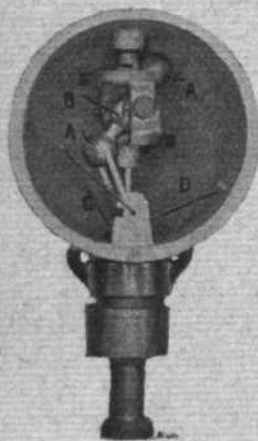
Wolseley 180-h.p.—British-built 8-cyl. V-type engine having its cylinders cast in pairs complete with the cylinder-heads, valve-chambers, and part of the water-jacket. The remainder of the water-jacket is formed by a sheet of copper held in place by screws. Over the valve-chambers is a detachable cover-plate separately water cooled. Particulars of this engine have already appeared in FLIGHT.

Dimensions.—140 mm. by 160 mm.; weight, 600 kilogs.; h.p., 180 at 1,000 r.p.m.; price, 25,000 francs.

SIMPLICITY IN SPEEDOMETERS.

THE ELLIOTT MECHANISM.

THERE are few motorists who have not made the acquaintance of the Elliott type of speedometer at one time or another, or who do not habitually use it upon their own cars, but we venture to think that comparatively few of them have any idea as to the internal simplicity of this beautifully designed little instrument. Certainly, judging from our own experience with it on numerous cars, they will neither have had any occasion nor any excuse to make investigations on their own account owing to any trouble that may have been experienced with it, or to any fault that is likely to have developed when in use.



At any rate the accompanying illustration cannot but prove interesting to those who appreciate a first-class instrument of this kind, and this to-day means every

owner and user of any make of motor car. Our photograph shows the interior of one of these speed indicators, made with a specially light case to render it suitable for aeronautic purposes, but otherwise identical as regards the moving parts, to the thousands of Elliott

speedometers which are in regular use in every part of the globe.

No difficulty will be experienced in recognising the governor-balls, A, which are pivoted upon a radial shaft mounted within their revolving casing, nor will any difficulty be experienced in following out the manner in which the ball on the left is linked up with the sliding collar, C, which rides upon the vertical revolving spindle, and engages with the recording-needle that is normally brought back to zero, and held up against one side of the collar by means of the light spring, D. It will, in fact, be observed that the life and soul of the instrument is the revolving casing that carries the two balls, A, which are free to rock about the spindle against the action of the coiled spring, B.

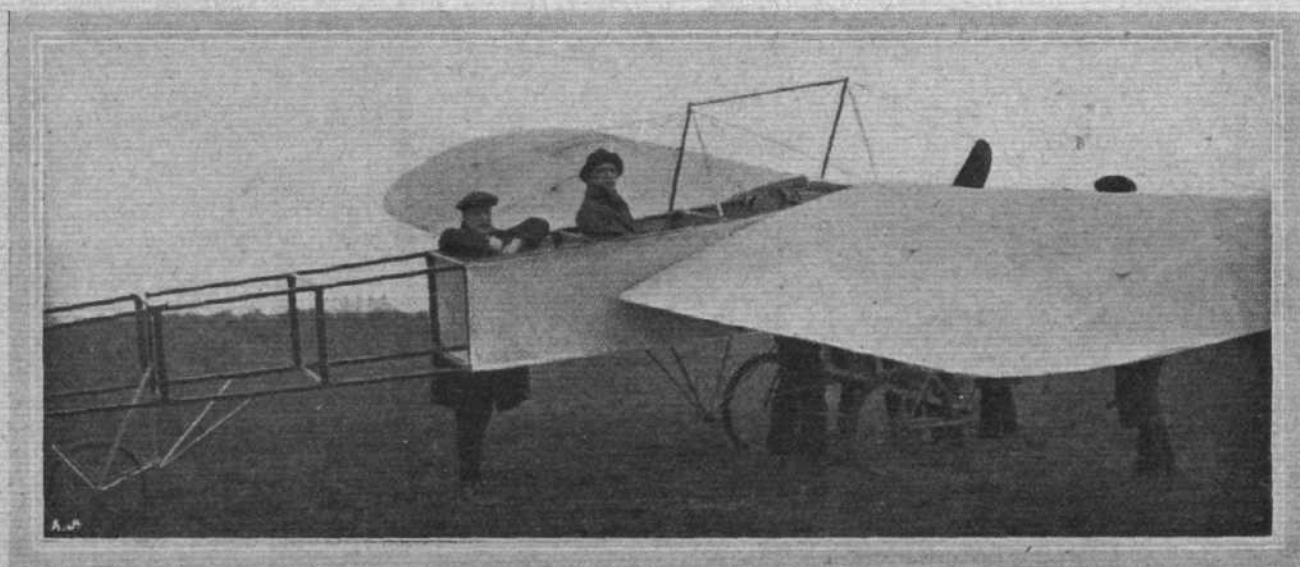
It is, of course, the centrifugal force acting on the balls, A, that causes them to fly outwards and assume a more nearly horizontal position against the action of the spring, B, while it is the fly-wheel effect produced by the nicely balanced casting carrying them which renders this celebrated make of instrument as dead beat as it is.

The actual instrument from which our photograph was taken has an aluminium case and a plain glass front whereon can be affixed any desired scale that may be needed by the motorist or the aviator; thus equipped it weighs no more than 28 ozs.

History on Canvas.

By way of commemorating the cross-Channel flight of M. Bleriot, the French Under-Secretary of Fine Arts, M. Dujardin-Beaumetz, has instructed M. Therenot to

paint a picture showing M. Bleriot being embraced by M. Fontaine on landing on British soil. M. Therenot was gazetted to the Legion of Honour on the same day as M. Bleriot.



Mr. G. W. Parkinson, of Gosforth, Northumberland, at the wheel of his Bleriot monoplane. Mr. Parkinson, as we recorded, made his initial flight at Newcastle three weeks ago.

AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 7th inst., when there were present: Mr. Roger W. Wallace, K.C., in the chair, Mr. Ernest C. Bucknall, Mr. Martin Dale, the Earl of Hardwicke, Professor A. K. Huntington, Mr. V. Ker-Seymer, Mr. F. K. McClean, Mr. C. F. Pollock, Hon. C. S. Rolls, Mr. J. Lyons Sampson, Mr. Stanley Spooner, and Joint Secretaries, Capt. E. Claremont, R.N., and Harold E. Perrin.

New Members.—The following new Members were elected:—

John Allen.	Rev. John Robert James.
Hugh Andrews, D.L., J.P.	Cedric Lee.
Major George Baillie.	Gerald Noel Cornwallis Mann.
G. H. Baillie.	A. Marsden.
Jacques Balsan.	James Melling.
J. J. Blow.	A. E. Morgan.
H. Percy Boulnois.	A. S. Morrison.
James A. Bradshaw.	James R. Nisbet.
Percy Gladstone Burnham.	Gavin W. Ralston.
J. V. Burn-Murdoch.	Blethyn T. Rees.
Capt. D. W. A. Campbell.	Charles E. Sheppard.
Malcolm Campbell.	A. Chatterton Sim.
E. Russell Clarke.	Capt. P. W. L. Broke Smith,
T. R. Hague Cook.	R.E.
Col. J. W. Cowley, I.A.	J. E. Spagnoletti.
J. Cundell.	Henry Burton Tate.
Montague Dixon.	Sidney Tebbutt.
Dr. P. T. Duncan.	Edmund Townsend.
G. K. B. Elphinstone.	Robert Barlow Tyler.
Allan Campbell Ferguson.	Maj. Henry Percy Uniacke.
Lieut.-Commander W. F. S.	M. Volk.
Fordes.	John Waddington, J.P.
S. E. Garcke.	H. E. Warner.
C. Gurney Grime.	Miss Fanny Wormald.
Hamilton Hobson.	

New Premises.

The Committee have acquired new premises at 166, Piccadilly. A large reading and writing room will be set apart entirely for the Members. They will be ready for occupation on January 1st next.

Aero Exhibition at Olympia.

The Society of Motor Manufacturers have decided to organise an Aero Exhibition under the auspices of the Aero Club of the United Kingdom, to be held at Olympia in March next. Members wishing to exhibit full-sized aeroplanes are requested to communicate with the Aero Club as soon as possible.

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary.)

To Club Secretaries.

IN order to cope with the rapidly increasing circulation of *FLIGHT*, it has become necessary to go to press earlier, and we would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of *FLIGHT*, 44, St. Martin's Lane, London, W.C., by 12 noon on Wednesday at latest.

An Aero Club for Scarborough.

ON Wednesday evening, the 1st inst., Mr. Ethelbert Castlehouse gave an interesting lecture before the members of the Scarborough and District Motor Club, entitled "The Conquest of the Air," illustrated by lantern slides. He brought the lecture to a close with a description and six slides of the gliding experiments which Mr. J. W. F. Tranmer and he had recently made.

An interesting collection of fittings for a biplane was lent by Mr. Tranmer; also many little accessories for models were on view.

Mr. Jno. W. Cooper, in proposing a vote of thanks to the lecturer, suggested that the Club should form an aero section. With this end in view, anyone in Scarborough interested in aviation is asked to communicate with the Secretary of the Motor Club or with Mr. J. E. Reed, 31, Elmville Avenue, Scarborough.

Scottish Aeronautical Society (185, HOPE STREET, GLASGOW).

At the recent general meeting of this Society the following office-bearers were appointed, including hon. president, the Duke of Argyll; hon. vice-presidents, Lord Elphinstone, the Earl of Kintore, Lord Provost McInnes Shaw, and Mr. Harold

It is also proposed to organise an exhibit of model flying machines. Those desirous of exhibiting are requested to make application to the Aero Club. Free space will be given to model exhibitors, and prizes will be awarded, particulars of which will be announced later.

Doncaster Aviation Meeting.

The following letter has been received from M. Molon, one of the aviators who competed at Doncaster:—

"29th November, 1909.

"SIR,—The Aero Club de France has forwarded me a copy of your letter, which you have addressed to them, remitting one month of the suspension passed on me for having assisted at the meeting at Doncaster. Please accept my assurance that I will in future abide by the rules of the Federation, and I regret extremely that I was forced to fly at Doncaster, as M. Delagrange had engaged me to do so.

"With my most sincere thanks,

"Believe me, dear Sir,
(Signed) "LEON MOLON."

Annual Dinner.

The annual dinner will take place at the Whitehall Rooms, Hotel Metropole, Northumberland Avenue, London, W.C., on Wednesday, December 15th, 1909, at 7.30 for 8 o'clock. In order to facilitate the arrangements, members are requested to make early application for tickets, and at the same time send the names of their guests, if any. Tickets, inclusive of wines, £1 7s. 6d. Members may be accompanied by ladies.

His Grace the Duke of Argyll has kindly promised to take the chair.

The dinner will be followed by a musical programme. Amongst others, the following well-known artistes will assist: Miss Nadia Sylva, Miss Mavis Clare, Miss Helen Mar, Mr. Frank Haskell, Mr. Aubrey Standing, Mr. Maurice Farkoa and Mr. Charles Hawtrey.

Membership.

Forty-seven new Members were elected to the Aero Club on Tuesday last, and the 1,000 Founder Members are now nearly complete. The Committee will consider the question of an entrance fee and increased subscription as soon as this number is reached.

E. CLAREMONT, CAPT. R.N.,
HAROLD E. PERRIN,

Joint Secretaries.

The Aero Club of the United Kingdom,
166, Piccadilly, W.

Harmsworth; president, Professor Barr. The list of vice-presidents includes Professor Biles, Professor T. Hudson Beare, Mr. Archibald Denny, and Mr. Hugh Reid. The following were elected to serve as the committee: Messrs. George P. Currie, James Gray, B.Sc., Philip L. O. Guy, R. W. Hogarth, J. R. K. Law, John MacGill, William MacNab, R. R. Speirs, Charles J. Waldie, Edward V. A. Willett, and Robert Guy. Mr. Walter G. Duncan is honorary secretary.

Yorkshire Aero Club (63, ALBION STREET, LEEDS).

ON the 3rd inst. Dr. Vaughan Bateson, of Bradford, lectured before the club on "The Conquest of the Air." The Chair was taken by Professor J. Goodman, who, introducing Dr. Bateson, said he was well-known as a traveller in Thibet and other parts of the world. He was a practical balloonist, and had studied closely the more modern aeroplane developments. In his lecture, Dr. Bateson reviewed the course of man's efforts to achieve flight, and concluded by saying that progress up to the present time could be summed up as the advancing subjection of the forces of nature to man's uses. It was now possible for man to ride the air, and such an achievement was a new note in the great song of human triumph. Just as the last century dawned with the power of steam only just realised and the uses of electricity little dreamed of, so did the twentieth century open with a vista of new wonders. He believed that most of these present would live to see the time when the mails would arrive from America, having crossed the Atlantic within the day.

THE LIMITATIONS OF AERIAL BOMBARDMENT BY INTERNATIONAL LAW.*

By COL. F. G. STONE.

THE bombardment or undefended towns by aerial vessels has become not only the stock-in-trade of writers of romance, but is freely discussed by responsible persons as an inevitable concomitant of war between civilised (?) nations. Thus to take a single example:—

On April 21st, at a meeting of the National Defence Association, Lord Montagu of Beaulieu read a paper in which he discussed the bombardment of London by airships, and pointed out that "projectiles filled not only with explosives, but with poisonous gases . . . would not only blow up and set on fire, but would suffocate as well"; and goes on to say: "I leave to the imagination of my hearers what effect a few hundreds of these shells would have on nerve centres such as the General Post Office, the chief telephone exchanges, the railway centres, the Stock Exchange, the Bank of England, and the other banks which closely surround it, the Royal Palaces, the Houses of Parliament, and the Government offices, and in the most crowded streets and most thickly inhabited portions of the Metropolis."

Lord Montagu's views were emphatically endorsed by such well-known and distinguished public men as Sir Vincent Caillard and Lord Denbigh, the former committing himself to the statement that: "We know perfectly well that during war time all means are fair." We would, however, remind Sir Vincent Caillard that although the adage hath it that "All is fair in love and war," yet we know well that any man who traded too freely on the former part of the adage, would render himself liable to social ostracism, and, as regards the latter part, there can be nothing more contrary to observed facts, whether we consider the code of school-boy honour, which regulates the settlement of youthful differences, or the punctilious etiquette of the duel, or, finally, the codification of the laws and customs of war, which shows a conscious desire on the part of civilised nations to play their part honourably in the great game of war, in accordance with an ever-progressive standard of humanity and moral obligation, which, so far as our experience goes, has hitherto been strictly observed. It would appear, therefore, that in the absence of any proved derelictions from the international code of honour in the past, we have no justification in assuming (as Sir Vincent Caillard does) that any nation will cynically cut itself adrift in the future from all moral obligations, on the plea that "during war time all means are fair." The bombardment of *defended* towns has always been recognised as a legitimate method of bringing about, or helping to bring about, their capitulation, and has been governed by the laws and customs of war in such a way as to minimise its horrors; these are codified in the following articles of the Annex to Convention 4 of the Hague Conference of 1907:—

Article 26.—The officer in command of an attacking force must do all in his power to warn the authorities, before commencing a bombardment, except in cases of assault.

Article 27.—In sieges and bombardments, all necessary steps must be taken to spare, as far as possible, buildings dedicated to public worship, art, science, or charitable purposes, historic monuments, hospitals, and places where sick and wounded are collected, provided they are not being used at the time for military purposes.

Paris suffered more at the hands of the Commune than from the German bombardment; of the civil population only 97 persons were killed and 278 wounded during the siege ("Vino's Seige de Paris," p. 380).

But the bombardment of undefended towns and the destruction of private property has never been permitted by the laws and customs of war, and is expressly prohibited by the Hague Conference of 1907, under the following Articles in Convention No. 4:

Article 23 (G).—It is particularly forbidden to destroy or seize enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war.

Article 25.—The attack or bombardment, by any means whatever, of undefended towns, villages, dwellings, or buildings is forbidden.

Convention 9.—And in Article 1 of the Convention respecting bombardments by naval forces in time of war, we read:

The bombardment by naval forces of undefended ports, towns, villages, dwellings, or buildings is forbidden.

Further, at the Hague Conference of 1899, the following declarations were adopted:

Declaration 1.—The contracting Powers agree to prohibit, for a period of five years, the discharge of projectiles and explosives from balloons, or by other new methods of a similar nature.

This declaration, which expired by efflux of time, was submitted

* Paper read before the Aeronautical Society of Great Britain, Friday, December 10th, 1909.

for renewal to the Conference of 1907, in terms providing for its continuance in force until the conclusion of the third Peace Conference. It was felt, however, by many of the Powers than inasmuch as aerial vessels used for reconnaissance or any other military purpose would certainly be attacked by every legitimate means, it was altogether unreasonable to deprive them of the means of retaliation, and nearly all the Powers, except Great Britain, the United States, and Austria-Hungary, declined to ratify. At the same time, it was felt that the use of projectiles and explosives by aerial vessels must be confined within the same limitations as govern their use by land and sea forces, and the insertion of the words: "by any means whatever," in Article 25 of Convention No. 4, was held to provide sufficiently for this; this was agreed to unanimously by all the great Powers.

Declaration 2.—The contracting Powers renounce the use of projectiles, the sole object of which is the diffusion of asphyxiating or harmful gases.

This Declaration, made in 1899, remains in force until denounced. A year's notice is required of the intention to denounce any Article of the Conventions of the Hague Peace Conferences.

It must be admitted that the Powers are unanimous in refusing to allow any licence in aerial warfare, which is not permitted in land or sea warfare, and that it is clearly their intention to prohibit bombardment, except as a means of breaking down the resistance of a defended town, or of destroying an enemy's warlike personnel or material. Thus it would be legitimate to bombard Portsmouth from aerial vessels in conjunction with an attack by sea or land, or both, against the defences; but it would not be legitimate to bombard Southampton. It would be legitimate to bombard Aldershot Camp if troops were lying there, and the town might suffer incidentally from its proximity to the camp. Again, it would be legitimate to bombard Woolwich Arsenal, and in this case also, the town might suffer incidentally. But when we come to consider London, we cannot admit that it is a "defended" town in the sense that Portsmouth is, or in the sense in which we believe the Plenipotentiaries at the Hague Conference used the term. True, there are forts at the mouth of the Thames to prevent the access of an enemy's warships to the docks and City of London, but it would be a strained interpretation of the intentions of the Powers to admit that if warships were attacking Chatham and Sheerness with a view to facilitating their undisturbed progress up the Thames, it would be justifiable at the same time for airships to bombard Cheapside with a view to creating a panic, on the plea that London was "defended" by the guns at Chatham and Sheerness, and therefore liable to bombardment in conjunction with an attack on those places. The intention seems clear that it would be justifiable to bombard the town of Chatham if such a proceeding were in any way likely to facilitate the capture of its defences, which, however, we cannot admit to be the case.

Apart, however, from the fact that bombardment of undefended towns would be an act of sheer barbarism, there is another aspect of the case. Would it be worth while? Mr. Mond, the Liberal Member for Chester, put this view of the question very clearly in the discussion which followed Mr. Haldane's statement to the House on the subject of airships for war purposes, on August 3rd. The Hon. Member said: "It was unlikely in these days that one nation would attack another by blindly scattering explosives about undefended towns. No nation would make peace simply because the enemy was killing its civilians."

Lord Balfour, Unionist Member for Chorley, Lancs., who followed, did not share "the optimism of the Hon. Member If the Hon. Member was right in saying that no civilised country would ever use airships to drop explosives on an unfortified town, was it too much to ask the Government to make inquiries among the other Powers of Europe with a view to agreeing at the next Geneva (? Hague) Conference to a clause providing that airships and explosives should not be used in that way. If the Powers did not mean to smash civil property in time of war, they would not object to such a proposal."

It may be admitted that the distinction between an "undefended" as opposed to "fortified" town lacks definition under modern conditions, and that in this lack of definition lies a possible danger.

It would be a distinct gain to civilisation if the next Hague Conference would introduce an article into the Convention regulating the laws and customs of war, somewhat to the following effect:

That no bombardment of any sort, whether by land or sea, or from aerial vessels, shall be permitted against any place or locality, except for the purpose of destroying its defences or defenders, or the war material contained within its boundaries.

SHOW MODELS WANTED.

ONE very excellent way of bringing the science of flight in its various forms before different sections of the public is by the organisation of exhibitions of models in connection with such semi-social functions as conversaziones. The organiser, it is true, has commonly not the easiest of tasks, but it can be lightened by others who have the interest of the movement at heart, rallying round to his support, and by doing so, they should at least experience the gratification of feeling that they are playing an unselfish part in a good cause.

For our own part we should like to see our readers come forward and offer their services in such matters, and we shall be pleased to receive the names of those who are willing to send their models to any *bona fide* exhibition of the kind named. Many of our readers

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SUSPENDED

"I HAVE before me copies of the correspondence which has passed between the Aero Clubs of France and the United Kingdom in reference to the penalties imposed by the latter upon Delagrangé, Le Blon, and Molon, for appearing at a proscribed meeting—Doncaster to wit.

"The sentence passed upon the flyers named, was one of disqualification from participation in all meetings held under the auspices of the International Aeronautical Federation during 1909, but as a result of the intercession of the French Club, this disqualification has now been

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LECTURES ABOUT THE COUNTRY.

Now is the season for lectures, and as far as can be judged from the reports to hand "flight" would appear to be the favourite topic. Such lectures are bound to do a great deal of good in awakening a widespread interest.

On Friday of last week there were quite a large number of such papers read. Among them we notice one at Ipswich by Miss Bacon, who accompanied her father, the

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Flight Meeting for Halifax.

ARRANGEMENTS are being made by the management of the Halifax Zoo and Amusement Park to hold a flying meeting on their grounds, commencing on Christmas Day and continuing till January 8th. It is said that three

must be making (if they have not already made), some very excellent examples of flying machines on a small scale, in which they have endeavoured to put the very best of their workmanship, and it is improbable that they should wish to entirely hide the light of their art under a bushel.

In this connection, at the present moment, we have a request from Dr. J. R. Ratcliffe, F.R.S., who is anxious to improve the occasion of the Annual Conversazione of the Midland Institute by an exhibition of models appertaining to flight. The conversazione lasts from January 10th to 14th, inclusive, and those of our readers who are willing to help should communicate with Dr. Ratcliffe, Elmdon, Wake Green Road, Moseley, Birmingham.

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AVIATORS.

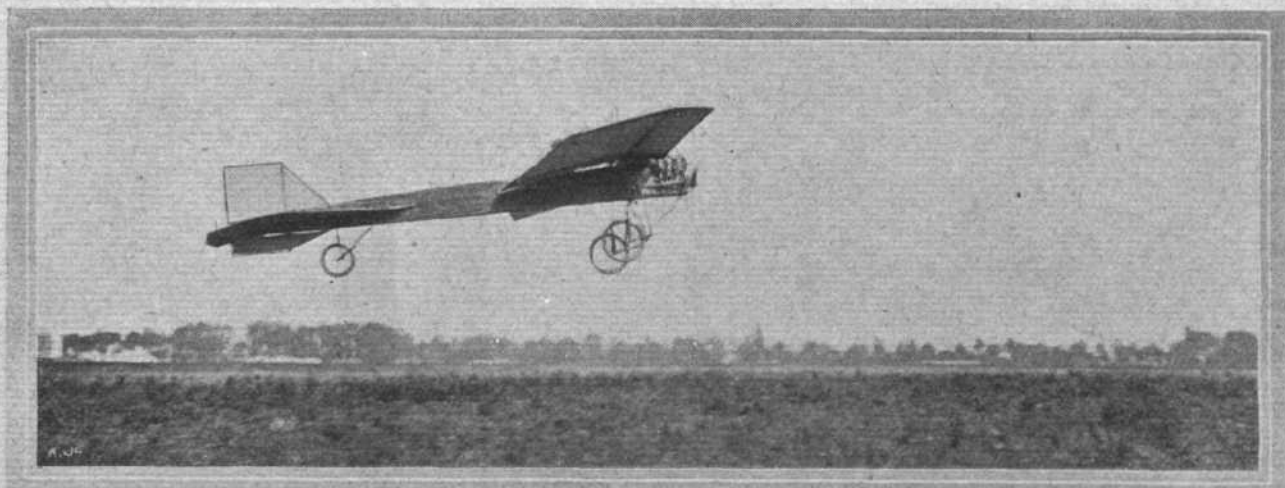
amended to cease from the first day of December. This establishes, at any rate, the fact that the Aero Club possesses certain real powers which can be exercised to the detriment of those who transgress the Club's rules. The fact has been in some dispute, or rather an atmosphere has been created which tended to obscure the fact. The only thing now necessary is for the Aero Club to act always in accord with the desires of those interested in the sport in this country, or to make its position clear in cases where disputes arise. Then we shall be all right."—Alec. J. M. Gray, in the *Motor News*.

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late Rev. J. M. Bacon, on many of his balloon trips, another at Ipswich by Mr. R. Stanley Lewis, a third at Smethwick by Alderman Pinkney, who is having an aeroplane constructed, and a fourth at Nottingham by Mr. Eric S. Bruce. On the previous day Mr. D. Balfour, jun., chose the same subject for his presidential address to the Newcastle Association of Students of the Institution of Civil Engineers.

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entries have so far been received—a monoplane which appeared at Blackpool, Mr. Pickersgill's machine from Keighley, and a biplane from London. With a view to stirring the aviators to make the most strenuous efforts to fly, they are to be paid £1 for every minute they remain in the air.



Koechlin in full flight at Port Aviation on his monoplane, which is fitted with a 4-cyl, 25-h.p. Gregoire engine.

AVIATION NEWS OF THE WEEK.

Lord Roberts on Aviation in War.

PRESIDING at a meeting held at the Royal United Service Institution on Wednesday last, when Major Baden Powell read a paper on "How Airships are Likely to Affect War," Lord Roberts gave very forcible utterance to some opinions which, coming from so high a military authority, will carry a good deal of weight with thinking people. He said that:—

"He believed the aerial machine had come to stay and that great improvements would be effected, and the developments would astonish those who came after us as much as the present dirigibles and aeroplanes had astonished us. Hitherto Britishers had not done much, but rather were waiting to benefit from the experience of other nations. What they had to do now was to set to work themselves. Airships would probably be of the greatest value in the next war, and as they did not know when that war would come they should not remain in the background, but have their own machines and their own men ready to adapt themselves to the machines. We were so apathetic about everything. The 'valour of ignorance' pervaded the whole country. People were brave and confident because they did not know what was going on. They would not be so valorous if they knew what was in store for them. They did not believe in anything happening, but were content to remain in ignorance."

Activity at Eastchurch and Rye.

AT the end of last week both the Hon. C. S. Rolls and Mr. Frank McClean made good flights on their Short-Wright biplanes at Eastchurch, the Aero Club's auxiliary flying ground in the Isle of Sheppey, and on Thursday the Hon. C. S. Rolls made one trip of a duration of twenty minutes. At Rye, Mr. Ogilvie is also meeting with continued success, and on the 2nd inst. he made a long trial, flying across the mouth of the harbour and out to sea, remaining aloft for sixteen minutes.

Developments at Eastchurch.

THE new auxiliary flying ground of the Aero Club at Eastchurch, about five miles from Shellbeach, is rapidly being developed. Among those who are having sheds erected there are Professor Huntington, Messrs. F. McClean, Percy Grace, Maurice Egerton, and Mr. Moore-Brabazon. Several of these buildings have now been completed, and the work on the others is proceeding apace. The erection of the whole of these

buildings has been undertaken by Mr. W. Harbrow, the contractor to the Aero Club, who also built "The Street" at Shellbeach.

Progress by A. V. Roe.

A CORRESPONDENT writes: "A. V. Roe had his new 20-h.p. triplane out this afternoon at Wembley Park, and made a number of good steady flights the length of the ground, which is about half a mile long. He flew from one end to the other, rising and falling at will, at times maintaining an altitude of from 20 to 30 feet.

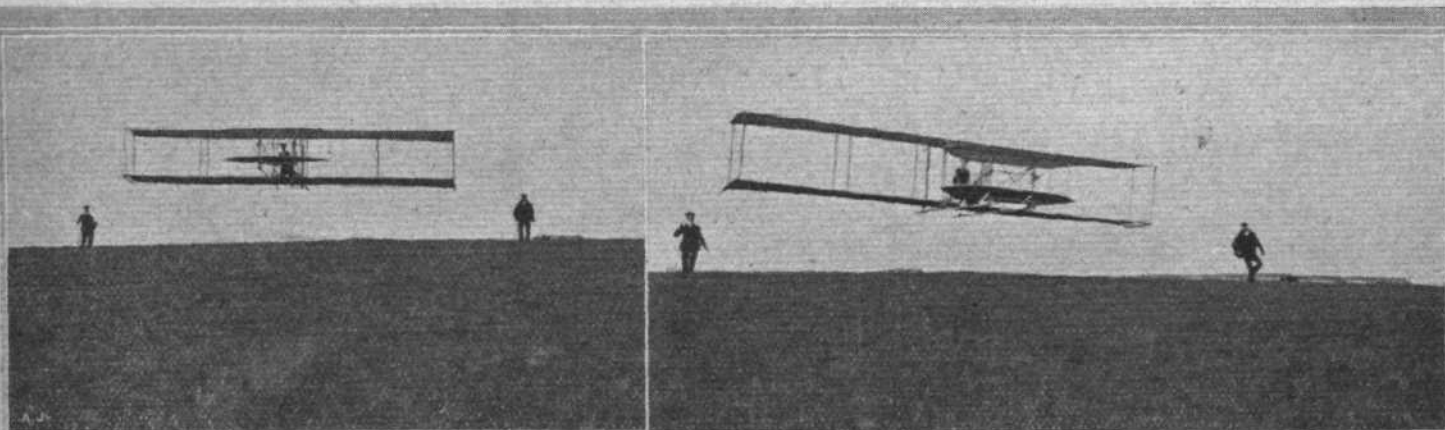
"Unfortunately, the circular course has not yet been cleared, so it was not safe to venture round. His control, which is of a novel type, *i.e.*, twisting and tilting the main planes, worked very well, for he had to dodge various obstacles. It is a pity he did not accomplish this, and previous flights, when at Blackpool, since these would have gained for him both the 'All-British' and 'British Aviator' prizes, amounting to £400."

Fatal Accident to M. Fernandez.

YET another has been added to the list of names of those who have met their death while experimenting in the cause of flight. On Monday M. Fernandez, who was present both at Rheims and Blackpool, but did not fly, was flying at Nice when, from some unexplained cause, his machine suddenly stopped and dropped to earth from a considerable height, the aviator being thrown from his seat and killed almost instantly. The biplane was of M. Fernandez's own design and construction, and built somewhat on the lines of the Curtiss machine. It was exhibited at the last Paris Show, and in that connection was illustrated and described on page 689 of our issue of October 30th last.

Mr. Mortimer Singer at Rheims.

HAVING obtained delivery of his new Voisin machine, Mr. Mortimer Singer is now practising with it at Rheims. As soon as he is sufficiently familiar with the handling of the biplane he intends to have it taken to the Croix d'Hins aerodrome, near Bordeaux, where he will continue his trials.



Preliminary to his recent successful flights on his Short-Wright flyer, the Hon. C. S. Rolls obtained considerable proficiency in soaring with a man-carrying glider, also built by Messrs. Short Bros., by special permission of the Wright Bros., early last year. This was the first made with proper seat for the operator to sit in an upright position, and levers working like the full-size power machines, in fact a miniature reproduction minus the power plant. Mr. Rolls has sent us a couple of unpublished "snaps" of his glider practice which helped him so much in manipulating the full-sized machine.

The Croix d'Hins Aerodrome.

DECEMBER 1ST was the day fixed for the official opening of the Croix d'Hins aerodrome, but a very violent storm overnight rendered it necessary for the ceremony to be postponed. In spite of the wind and rain, a large crowd of people went out from Bordeaux to the flying ground in the hope of seeing some flyers in the air, but they had to be contented with walking round Delagrange's Bleriot monoplane. The ground is by no means finished yet, and it is expected that a couple of months may elapse before it is completed.

A New Height Prize.

M. PAULHAN having won the Lazaire-Weiller prize, the Ligue Nationale announce that a new prize of 1,000 francs has been given by Baron de Caters and will be awarded to the aviator who before January 1st next flies not less than 200 metres above the earth, after having officially entered for the prize.

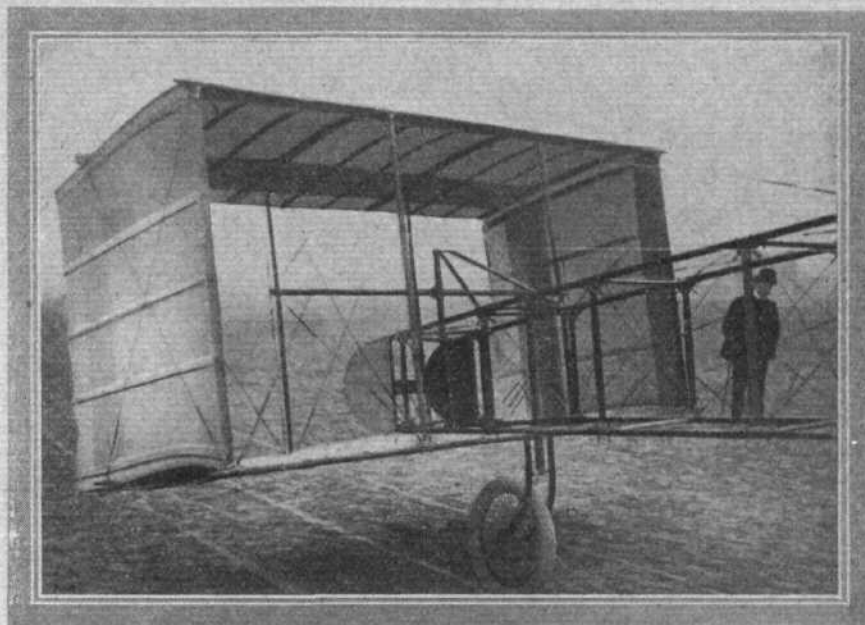
High Flying Records.

IN the paragraph recording Latham's wonderful flight at Chalons last week, by a slip it was said that he had beaten Paulhan's record. As a matter of fact he intended to go higher than Paulhan's 600 metres, but the latter was not officially observed, and so the world's record was Latham's own 416 metres. On this occasion he was credited by the Aero Club official, Mr. Kergarion, with having reached a height of between 475 and 550 metres, and this is now the world's record.

Doings at Chalons.

M. SOMMER completed the reconstruction of his Henry Farman biplane at the end of last week, and at the first opportunity intends to make an hour's flight before delivering it to his pupil, Gremont, who has purchased it. It is said that M. Sommer has incorporated several of his own improvements which have given marvellous results in private trials in the Ardennes. On Friday of last week a tempest raged over the camp, and

blew down the tent, shattering Prince Bolotoff's triplane, which has since been removed to MM. Voisins' works for repair.

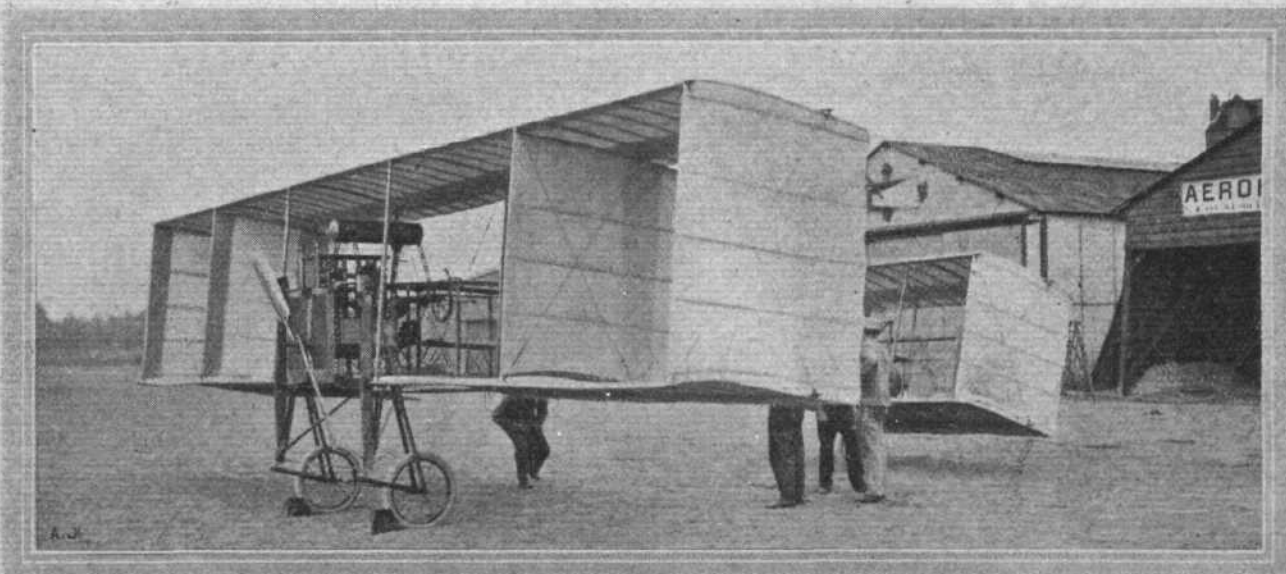


Another view of the new Voisin biplane, showing details of the tail of the latest model.

On Sunday both Mr. Latham and M. Paulhan were out, and flying high, as usual, Latham contenting himself with reaching an altitude of 100 metres, while Paulhan went up to 250 metres.

Cross-Country Flying.

THERE is promise of a good deal of cross-country flying being indulged in in the near future in France if the plans of some of the prominent flyers materialise. Delagrange is said to be arranging to fly from Bordeaux to Paris. M. Bregia has announced his intention of flying from Paris to Tours by stages. M. Paulhan wants to make a bold bid for the second of the Ae.C.F. cross-country prizes before he goes to the States, and M. Tissandier has an idea that he would like to pay a flying visit to the Croix d'Hins Aerodrome.



THE NEW VOISIN BIPLANE.—We recently gave particulars of the important alterations made in the latest Voisin models, and the above photograph clearly shows these new departures.

Nice Flight Meeting in April.

PROGRESS is being made in the organisation of the meeting which is to be held at Nice from 15th to 30th April next. The programme will be framed upon those which have been in use at other meetings, but new events will be introduced, such as landing competitions, &c. There will be racing on ten days, and other days will be devoted to cross-country flying from Nice to Monte Carlo and back, to Antibes and back, to Cannes and back, &c. The first prize in the Nice to Monte Carlo event will be £2,000 and the second prize £400.

A Paris-Brussels Race.

ON the authority of the *New York Herald* it is announced that the A.C.F. at their last meeting gave favourable consideration to the proposal to organise a race for aeroplanes between Paris and Brussels some time during next year. The distance between the two capitals is 300 kiloms., and a sub-committee is now considering the conditions for the event and whether it will be possible to do it in one stage. Should the project materialise, the finish would be at the International Exhibition which will be held at Brussels next year.

Date of Havre and Lyons Meetings.

DATES have now been selected by the committees which are organising the flying meetings at Lyons and Havre. The former have ear-marked May 14th to 22nd for their "week," while the Havre meeting, which will also extend to the towns of Trouville and Deauville, will be spread over a fortnight in September.

Flight in Austria.

HERR ETRICH, who has been experimenting in Austria for some years with flying machines of his own design, at last seems to have met with some success. According to the *Neue Freie Press* Herr Etrich, at the aviation ground at Wiener-Neustadt, recently made a flight of $4\frac{1}{2}$ kiloms., attaining a speed of 70 kiloms. an hour at a height of 25 metres.

And in Hungary.

HUNGARY is also taking an active interest in flying matters. On the 2nd inst. Dr. Kutassy, who has recently obtained delivery of a Maurice Farman biplane, succeeded in flying at Budapest for 5 kiloms. at a good height, about 2,000 people witnessing the trial.

An "Aérolistatoplano."

AMONG the models which were on view at the flying exhibition at Turin was one of a curious combination of

the lighter- and heavier-than-air machine, which Sig. Virginio Florio, the inventor, dubbed an "aérolistatoplano." In form the machine is a monoplane, but the chord of the main planes is almost as great as the spread of the wings. The planes are of wedge-shaped section, and it is proposed that they should be filled with gas.

Flying at Cincinnati.

ON the 12th, 13th, and 14th ult., a flying meeting was held at Cincinnati, Ohio, under the auspices of the Weal Aero Club, and about 10,000 spectators assembled each day to see short flights by Curtiss and Willard, on Curtiss biplanes, and ascents by Messrs. Roy Knabensrue, and Lincoln Beuchy and Cromwell-Dixon, in their respective small dirigibles.

Flight at the Polytechnic.

IN connection with the course of instruction in aero engineering at Regent Street Polytechnic, Mr. Holroyd Smith delivered a lecture entitled "Observations on Flight" on Friday of last week. Mr. Smith described the various types of wings of birds and insects and their action, and the deductions to be derived therefrom. He then went on to deal with various problems relating to mechanical flight, such as action and reaction, compression and displacement, produced and induced currents, and wind pressures.

Winter Fashions for Flyers.

As the year draws to a close, and the contest for the Michelin Cup becomes keener, the flyers have to consider the question of protecting themselves from the cold during the long time they are flying. For his record-breaking flight, the other day, Henry Farman rigged up a sort of enlarged foot muff, which, besides enclosing his legs, was continued up, so that it also protected the body of the flyer, and considerably lessened the discomfort consequent upon his four and a half hours' ride in the chilly air.

Flyers Repaired.

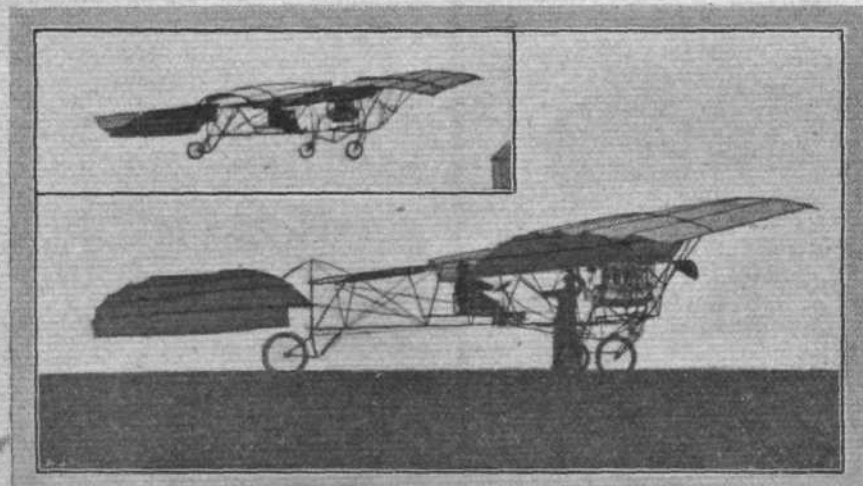
To come across a notice to the effect that "all kinds of airships, monoplanes, and biplanes repaired on the shortest notice—garage for airships now open," would be sufficiently startling in any locality, but to find it on an Essex highway is certainly humorous. Perhaps the enterprising garage proprietor imagines that all the flyers and dirigibles in the kingdom only need a notice of this sort to put in a long-expected appearance. We, too, could wish that it were as easy to bring them into being.

Aeroplane Ferries.

FINDING his patience tried to the utmost by the intermittent service of steamers between Sicily and Italy, Chevalier Florio, it is reported, is determined to see whether he cannot render himself independent of them. To that end he has ordered a Voisin biplane, and has sent one of his chauffeurs to the works in Paris to be taught how to manipulate it, in view of the proposal to use the flyer for transporting Chevalier Florio across the Straits of Messina.

Flying at Brooklands.

MR. NEALE made a most successful flight the length of the Brooklands ground, on his Bleriot machine, on Sunday morning, attaining an altitude of 14 to 16 ft., the height of the sheds, and alighting easily. He had previously made several short flights at no great distance from the ground.



An Italian Monoplane—the Miller Aerocurve—built at Turin.—Inset is the machine as seen when in flight.

AIRSHIP NEWS.

A Big German Airship.

IN a letter to the Press, Baron v. Roenne gives some interesting particulars regarding a proposed aerial liner designed by Herr Albert Wetzel, of Stuttgart. It will be 984 ft. long, 65½ ft. in diameter, and the envelope is to be of a magnalium alloy, with a capacity of 3,031,216 cubic ft. The builder intends to fit the airship with motors of 1,200-h.p., with which he proposes to attain a speed of from 45 to 55 miles per hour.

According to the calculations, the airship will possess a total lifting power of 103½ tons. A vessel of such dimensions would weigh at least 75 tons, leaving a margin of 28½ tons for cargo. It is plain, however, that it would be possible to carry 400 passengers on board.

Austrian Military Dirigible.

THE Austrian military authorities are now possessed of a dirigible of the Parseval type, constructed in Austria from plans drawn up by Major Parseval. The dimensions of the envelope are 49 metres long and 10 metres diam. at the largest part, the capacity being 2,400 cubic metres. The motor weighs 400 kilogs. and develops 60 h.p. The first ascent on the 26th ult. was very satisfactory, the airship manœuvring over Fischamend, about twenty-five kiloms. from Vienna, for about half an hour. Snowstorms delayed the trials for a few days, but on the 1st inst. a seven hours' trip was safely negotiated, the dirigible first traversing Vienna, then flying on to Schönbunn, where the Emperor Francis Joseph is staying for the winter, and finally spending the remaining time in cruising over the country round about the Austrian

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FRENCH ARMY AND AEROPLANES.

THAT the French Government is seriously turning its attention to the development of the aeroplane for military purposes is shown by the fact that three Henry Farman biplanes, a Wright biplane, and a Bleriot monoplane have been actually ordered, while experiments, at the suggestion of the Minister of War, are to be carried out on two Antoinette monoplanes fitted with machine guns. In addition to these machines, the French War Office is also negotiating for the purchase of a Voisin machine. In each case the purchase contract stipulates that an Engineer officer must be taught to pilot the machine, and when they have been thoroughly trained

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MUNICIPAL ENCOURAGEMENT IN FRANCE.

A BIG scheme for the encouragement of aviation by the municipal authorities of Paris is being proposed by M. Henri Turot. The idea is that a new department in the civic administration should be formed for the purpose of controlling and awarding the prize of £4,000 which it is suggested should be offered by the Parisian municipal authorities annually for improvements in aeroplane con-

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Imperial Dignity for German Aero Club.

So enormously has aeronautics in Germany progressed that H.I.M. the German Emperor has caused to be issued a patent conferring the privilege of prefixing the word "Imperial" to the title of the German Aero Club. This dignity has only been accorded previously to the Imperial Automobile Club and the Imperial Yachting Club. His Majesty has also shown his

capital. The total distance traversed was about 260 kiloms.

"Gross I" in Commission Again.

THE German military dirigible "Gross I" is now fit for service again, the damage occasioned by her tumble into the Stettin, near Wollin, last September, having now been made good. Advantage has been taken of the opportunity to incorporate one or two modifications into the vessel. She has been lengthened by 8 metres and more powerful motors have been fitted, so that she is now practically identical with "Gross II." As soon as her trials have been completed she will take up her station at Cologne.

Forlanini Dirigible.

SEVERAL trials have recently been made with the airship "Leonardo da Vinci," designed and constructed by the Italian engineer, Forlanini. Piloted by the designer, assisted by Capt. del Fabbro, the airship made flights of about twenty minutes' duration on the 27th and 28th ult. On each occasion a considerable speed was attained.

Russia and Germany have Scareship Visit.

GREAT BRITAIN does not appear to be singular in having the attentions of a "scareship." Recently an announcement has been made that a mysterious aerial craft, presumed to be Swedish, has been hovering over Reval at a height of about 1,200 ft. It disappeared in the direction of the Finnish coast. Considerable excitement has also been caused in Russia by reports that another airship has been seen manœuvring over the Russo-German frontier.

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they in their turn will act as instructors to their fellow officers. With regard to the Wright flyer, the French Army already possesses a fully qualified pilot in Capt. Lucas-Gerardville, who was trained by Wilbur Wright himself, and it is probable that he will be placed in charge of the Military Aviation School as chief instructor. It is reported from Paris that already secret trials have been made with machine guns fitted to aeroplanes, and so successful have they proved that the military authorities have decided to divert a good deal of their attention from dirigibles and give greater consideration to the heavier-than-air machine.

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struction and skill in the navigation of the air. The conditions of the proposed tests will be very severe; 4,800 feet is mentioned as the minimum altitude to be attained; the machine should be capable of carrying a photographer as well as the pilot, be capable of flying in any weather, and able to stop or slow down in order to allow the operator to make his observations.

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personal interest in the welfare of the Club by designing a special costume for the use of its members. This action of the Emperor William is bound to give further impetus to both the aeroplane and airship movements in Germany. May we hope, with a view of giving the home industry a help, that a similar honour may be accorded to our British National Society of Encouragement, the Aero Club of the United Kingdom?

REVIEWS OF BOOKS.

Forecasting the Weather.

By D. W. HORNER, F.R.M.S.
(Witherby and Co. 6d.)

AMONG the attributes of the successful aviator, ability to accurately forecast the weather should prove by no means the least useful, so that any hints and tips contributing to a knowledge on this very tricky subject ought to have an especial interest to our readers. Those who like to make a simple beginning in such matters cannot do better than acquire the second edition of Mr. D. W. Horner's booklet which has just been published by Messrs. Witherby. Its supplementary title, "Meteorology without Instruments," conveys an exact idea of the scope of the subject. It commences with a catalogue of clouds, and tells the reader what they all mean—sometimes. In fact, it is just the remarks relating to the qualification "sometimes" which constitute such an important feature of the little work.

Flying Machines.

By A. W. MARSHALL AND H. GREENLY.
(Percival Marshall and Co. 1s.)

A NEW edition of "Past, Present and Future Flying Machines" has just been published by Messrs. Percival Marshall, and as might be expected, is somewhat larger in bulk than its predecessor. Its scope includes dirigibles as well as aeroplanes, and there are several illustrations not only of machines that have flown, but of models of those that it is hoped may fly at some future date.

Aeronautical Navigation.

By COMMANDER R. A. NEWTON, R.N.
(Elliott Bros.)

It has probably not struck a good many people that the air pilot of the future has got to know very nearly as much about the science and art of navigation as the man on the bridge of a sea-going ship. It is all very well to fly from a shed round a field and back again in the full daylight, when the destination is visible from the starting point, and it is all very well to go long journeys in motor cars by road where signposts point a kindly finger in the direction, more or less, that one should go; but it is by no means so straightforward to make an aerial journey from, say, London to Paris, during the course of which all sorts and conditions of disturbances may be encountered which might quite likely make the destination unexpectedly turn out to be Berlin.

A glimpse of the problem can be obtained from a brochure which Commander R. A. Newton, R.N., has written for Messrs. Elliott Brothers in connection with some of their aerial navigating instruments. Although it is perhaps early days yet for this side of flight, more might certainly with advantage be written on the subject.

The Force of the Wind.

By PROF. HERBERT H. CHATLEY, B.Sc.
(Chas. Griffin and Co.)

PROFESSOR HERBERT CHATLEY, who has already written a book entitled "The Problems of Flight," has now published another entitled "The Force of the Wind," in the form of a small scientific textbook, containing a review of the principal theories and work of those who have devoted a

considerable amount of time to the practical solution of this very intricate problem. There has not, as Professor Chatley remarked in his preface, previously been any concise work devoted solely to the subject of wind pressure in relation to engineering, for although much has been written on the subject, the information is mainly confined to chapters of different books, and is therefore rather inaccessible to anyone who wants a concise summary on this matter alone.

Flying.

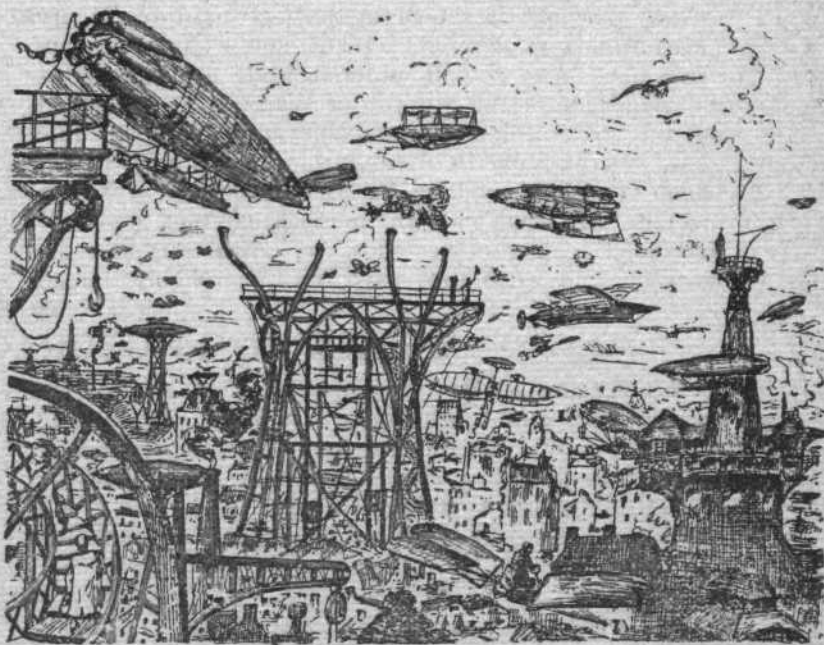
By AERO AMATEUR.
(Hilfe and Sons. 1s.)

AN attempt to set forth the why and wherefore of flying has been made by the writer of this book under the pseudonym "Aero Amateur." With the opening sentence, "Whether one regards flying as the most scientific of sports, or the most sporting of sciences, there is no doubt about its being the most fascinating pastime possible at the present day," we cordially agree; the subsequent explanations of various phenomena associated with aerodynamics touch upon a subject on which it is less easy to be of one accord, but the author of the little book has at any rate attempted to expound theories in simple language which fit in with his views of the case.

L'Homme s'envole.

S. DE FORGE.
(Paris: Berger-Levrault. 1 fr. 25 c.)

THIS little book on flight by S. De Forge commences with chapters devoted to "Yesterday and To-day," and contains a brief description of the different principles of flight, and references to the leading types of machines.



The latter half of the work is devoted to the problem of flight, and is divided into sections dealing with the Engine, Stability, The Air, Flight in War, in Commerce, and in Sport. What flight will be like in some fifty years is portrayed by a fantastic sketch of M. de Cordoue's, which we reproduce.

FLIGHT IN 1915.

WITH the object of eliciting what various prominent folk in France really thought about flight at the time a French contemporary hit a month or two ago upon the happy idea of inviting expressions of opinion from several of its readers. They were, in fact, asked to give their individual ideas as to what the position of flying would be in six years' time from now. We append abstracts from some of the replies received—replies which are amusing if only because of the diversity of styles in which the subject was treated, some prophetic, some hesitating, and others jocular. We also give at the end the views of M. Jules Bois, the distinguished French writer, as to the changes he thinks likely to take place in Europe in one hundred years' time.

Michel Corday.

Multiplanes will be about four metres in span, will carry three passengers, and travel at 150 kiloms. per hour. Flight will never be more than a sport, and it will be handicapped by the restrictions of the octroi and customs. There will be 300 French aeroplanes in 1915, and it will be possible to fly from town to town; each city will have a proper landing space. It will be possible to cross the Channel and fly straight to Paris. There will be seventy competitors for the Bordeaux-Paris Race, and about this time a machine known as the helicopter, being a combination of the helicopter and glider, will commence to give interesting results.

Emile Bergerat.

Flight will have the effect of virtually turning modern houses upside down. The sixth floor will be considered the best, being in closest proximity to the aerial way. The *concierge* will live under the roof. *L'Ascenseur devient le descendeur et le rez-de-chaussée la mansarde aux poètes.*

Pierre Giffard.

I hope that in five years the aeroplane will become the aerial cab, and that the aerobus will run from town to town. I hope that by Easter, 1915, the French Army will have an aeroplane corps. I hope, I know not what!

The Late Captain Ferber.

In five years the aeroplane will achieve a speed of 150 kiloms. an hour, and will carry from four to five passengers. It will be a larger machine than at present, and will neither possess lifting screws nor devices for automatic stability. It will possess wheels and ski, and round about towns will be placed garages provided with starting devices. A regular aeroplane service will be in operation between Calais and Dover, and there will be in course of construction at most ports flying machines of from 1,000 to 2,000 h.p.

Luxury and snobbishness will have commenced to invade flight, and I shall be no longer "admiral of the air."

Victor Margueritte.

Faith in the progress of the new science, faith in the persistence and ingenuity of our aviators, faith in the endless resources of France, this country of revolutions which, having subjugated earth to her purpose is among the first to penetrate sky and sea; it is by an expression of faith alone that it is possible to reply to this question.

M. de Castillon de Saint Victor.

In 1915 the aeroplane will be a very fast flyer, travelling at 120 kiloms. an hour at least. It will always be very limited as to its carrying capacity, and will be unable to accommodate more than three or four passengers.

If, on the contrary, this speed is not realised by the date in question, flight will no longer exist.

Major Driant.

My opinion is that the aeroplane, in five years, will be what the racing motor car has already become, with this difference, that costing less it will be more used. We shall see aeroplanes traversing the air at an altitude of 50 metres, evading towns, flying by recognised courses, and attaining a speed of 200 kiloms. an hour. Sportsmen and dare-devils will alone use them, on account of the frequent accidents which will take place. It will only be possible to carry two or three persons on board.

Should we happen to have war between now and 1915 the aeroplane will certainly play its part in reconnoitring.

Maurice Leblanc.

In five years social life will be transformed by the flyer. Rich men, if there are any, will live on the sixth floor and lifts will be called "descenders." Distance will cease to exist, for Nice will be within two hours by the *côte d'azur Aérien*.

But in five years the aeroplane will still be called "aeroplane," and that will break my heart.

Maurice Farman.

1. I believe that the aeroplane will exist only for sport, and will be reserved in consequence for a very small number of users.

2. As to the aeroplane from the point of view of transport, it will not exist in six years' time.

Henry Kistemaeckers.

You wish me to give an opinion on this subject in ten lines? Heavens! I should find it difficult to cram my ideas into 300 pages. My new novel of aerial life, "Aeropolis," is itself no less than an impressionist anticipation, and decidedly I will not give you a *résumé* of the plot here in ten lines! At Easter, 1915, my friend, we shall no longer recognise life.

Tristan Bernard.

In five years the aeroplanes will be so numerous as to obscure the sky, and it will have become necessary to prohibit their flight; but, like the Metropolitan Railway, they will be used underground. This prophecy is not more at a guess than most.

Victor Tatin.

In five years the aeroplane will be much more simple than it is to-day; I have always thought the best way of obtaining a rapid flyer that should not offer much resistance would be to make them like projectiles as near as possible; we are far from it yet, but I believe it will soon come. Such machines would probably consist of an enclosed body fitted with a single pair of wings and a rudder at the rear, where the propeller will also be situated. The Bleriot and Pelterie machines are prototypes which it will be well to develop.

Ernest Archdeacon.

In principle aeroplanes will remain unaltered in five years' time; at present they could be built to attain 200 kiloms. an hour, which would considerably reduce their size. From the sporting point of view they will be admirable, and they will have, moreover, a military importance. As machines of transport their scope is more doubtful. I rule out at once all heavy load carriers, for the reason that it would be impossible to develop such machines in the time. As to the possibility of special machines in this class, I hesitate to predict. I believe that in the present state of the science the aeroplane is very far from being used for transport, mainly because of the difficulties of starting and landing, and because of the dangers which would attend a forced landing with a heavy machine on account of a breakdown *en route*.

Stephane Lauzanne.

No doubt there will be a daily service of aeroplanes between Marseilles and Algiers, while two flyers a day will do the journey from Paris to London. No doubt there will be 10,000 aeroplanes registered with the Paris police, of which 7,000 will be fitted with taximeters. M. Lepine, it is certain, will have an aerial police force of 400 men-birds to regulate traffic and maintain order. It alone remains to be seen if they will do better there than on earth. The dark side of life will then be for the pedestrian, who will no longer be able to go out without risk of being damaged by a falling petrol tin or struck by some tool which has slipped from the celestial mechanic's hand. But the happy side will be that customs and octroi will cease to exist; it will be the taxpayers' turn to annoy the Ministers of Finance of the Third Republic, which will be but justice, as it is for long enough that the Ministers have plagued taxpayers.

MM. Max and Alex. Fischer.

Replying to your query, allow us to place before you the following documents, which will doubtless appear in *L'Auto*, April 28th, 1915:—

Unification of Aero Taxi Fares.—The great difference in fares charged by aero taxis is confusing to the public. Certain short

journeys like Paris-Marseilles, for instance, are charged for at the rate of 6 or 7 fr. on one flyer, and cost 20 or 22 fr. on another. In consequence M. Lepine, our sympathetic and always just Prefect of Police, has just made the following decision, which will satisfy everyone:—

After the 1st of May next, all flyers fitted with blue taximeters will charge 1 fr. 50 c. for the first 100 kiloms. and 30 centimes for the following 50 kiloms. Flyers fitted with red taximeters will charge 1 fr. 75 c. for the first 100 kiloms. and 40 centimes for each subsequent 50 kiloms. A fixed return fare of 1 fr. will be payable if the traveller discharges the flyer outside the frontier.

J. H. Rosny.

Let us be optimistic. It pleases me to imagine that in five years the aeroplane will have made prodigious progress. I shall see, in 1915, neither aero-trains or aerial buses, but I imagine sporting contests between Paris and Pekin, Berlin and Timbuctoo, London and Calcutta, and a tour of the world by Roosevelt in search of the last eagles and condors.

G. Dupuy.

Last night I had the following dream:—It was the end of August, 1915, and terribly hot. I was having a "bock" with a friend on the boulevard, when the newsboys came crying a special edition of *L'Auto*. On the copy I bought was an enormous legend saying: "From Rome to London by aeroplane. Nazzaro covers 2,540 kiloms. in 16h. 4m. 2s. He replenished fuel at the aero stations of Turin, Lyons, the Eiffel Tower, and Calais."

Mme. de Thebes.

One cannot go against Nature, monsieur, and Nature has only created the bird to make us lift our eyes towards the Infinite, and to

cause us to think that it is the domain only of souls and spirits invisible.

P. Sensier.

I think that in five years' time the aeroplane will be a sporting sort of affair, and possibly also a dangerous engine of war, but as to believing that we shall have an aero bus service on the Batignolles-Clichy-Odeon route, the idea simply makes me laugh.

C. F. Baudry.

In five years, man will have flown and re-flown across the Channel, or at least the Pas de Calais, but no one will have scaled the lowest mountain. The aeroplane will remain for many years yet a sport confined to flat countries.

S. De Forge.

In 1915, engines will weigh under 1 kilog. per horse-power, and flyers will be fitted with two motors driving independent propellers. Wheels will be abandoned in favour of runners, and the body will be enclosed.

M. Jules Bois

Predicts, as the changed conditions one hundred years hence, that the great cities will be practically uninhabited except for business purposes during the day time. All classes will live in the country or in garden cities at considerable distances from the towns, to which access will be cheap and extremely rapid owing to the enormous development of all methods of conveyance, from pneumatic railways to flying cars.

The motor car will have gone completely out of fashion, but the bicycle, in a new form, will be once more in favour, for a sort of flying bicycle will be invented which will enable the rider to soar in mid-air.

✱ ✱ ✱ ✱ CORRESPONDENCE.

* * The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

NOTICE.—Correspondents asking questions relating to articles which they have read in **FLIGHT**, would much facilitate our work of reference by kindly indicating the volume and page in their letters.

ARTIFICIAL BIRD'S WINGS, &c.

To the Editor of **FLIGHT**.

SIR,—I write regarding flapping wing machines. In a bird's wing the feathers look as if they are made to part on the up stroke, and close together closely on the down stroke. The tips of the rear edge of one feather fitting into the curve of the front edge of the next feather. If an artificial wing could be made on the same lines it would be a little help towards flying.

Would you also please tell me the easiest way to find the centre of gravity of a model.

Yours truly,
GEORGE MORRIS.

[It seems probable that the obvious convenience of being able to fold the wing has something to do with its special construction. Messrs. Frost and Hutchinson constructed wings out of artificial feathers for some experiments which they conducted some time ago, and their work is the most notable in this direction. We purpose referring to their experiments in **FLIGHT**.

The centre of gravity of an object is that point about which it is absolutely balanced in all directions. It can be approximately found by suspending the object on the end of a fine thread.—ED.]

To the Editor of **FLIGHT**.

SIR,—I notice Mr. N. J. Bowater expresses the wind pressure as '0023 V². Is this value correct, as I have seen it variously stated as '003, '0034, and '00327 V²?
Tottenham.

ZEPHYR.

[According to Dr. T. E. Stanton's experiments at the National Physical Laboratory, the wind pressure constant is from '00318 to '00322. The uniform current of air constant is '0027.—ED.]

FLYERS ANALYSED.

To the Editor of **FLIGHT**.

SIR,—Whilst studying your journal, which I have done from the beginning, I found it rather difficult to form any idea of the relative sizes of the different machines. I also found variations in the figures given for the horse-power, weight and area; however I have taken what appear to be the most accurate figures and worked out the

enclosed table, which I think you may find rather interesting. Taking the weight lifted per sq. ft. as the efficiency of the planes, the monoplanes lead, headed by Bleriot. The more efficient the planes the smaller they can be, therefore they will be lighter and offer less resistance, hence saving power in two ways. If the aim be to raise the most weight per horse-power, then the Wright leads easily, followed by Cody and Bleriot and Farman in a bunch. Big planes, with their liability to accident, may be as expensive in upkeep as big horse-power, therefore I take the efficiency as the horse-power area per lb. This scale shows great variations, though four of the machines have practically the same figure, the Bleriot shows an amazing superiority, the Dumont being a fair second and the Cody a poor third. It appears to me that the Antoinette should be able to carry another ton if it were as efficient as the Bleriot. It would be interesting to have more expert opinion on this point.

Analysis of Modern Flyers (K. H. Evans).

Name.	Weight.	H.P.	Area.	Lbs. per sq. ft.	Lbs. per h.p.	Sq. ft. per h.p.	H.P. × sq. ft.	(H.P. × sq. ft.) per lb.
Antoinette...	1,210	50	365	3.3	24.2	7.3	18,250	15
Bleriot ...	666	24	150	4.44	27.7	6	3,600	5
Dumont ...	412	30	115	3.59	13.7	3.8	3,450	8.3
Farman ..	1,382	50	410	3.1	26.82	8.2	21,000	14.9
Cody ...	2,240	80	780	2.89	28	9.7	62,400	13
Curtiss ...	550	30	272	2	18.3	9	8,160	14.9
Voisin ...	1,150	50	445	2.59	23	8.9	22,250	19
Wright ...	1,050	30	540	1.94	35	18	16,200	15.4

Exeter.

Yours truly,

K. H. EVANS.

(H.P. × Sq. Ft.) Per Lb.—This may be said to represent the efficiency of the machines. The figures are obtained by dividing the product of the horse-power and area by the total weight lifted. The last column but one gives the product of the horse-power and area.

[Mr. Evans is to be congratulated on the way he studies his subject, no less than on the open-minded manner in which he has put the results of his work before other readers of FLIGHT; it is a sign of the real interest which makes for progress. It is always a matter of regret to us that the exigencies of recording up-to-date news from all over the world precludes the possibility of personally verifying dimensions; we exercise every endeavour to ensure accuracy, but it is sometimes of little avail in the face of contradictory evidence. The data compiled and analysed by Mr. Evans touches a fundamental side of the subject, which we hope to see described by other readers.—ED.]

COVERING FOR PLANES.

To the Editor of FLIGHT.

SIR,—I am constructing a plane 24 ft. long by 3 ft. 6 ins. wide, made of bamboo poles, 1 in. to 1½ ins. diameter. Would any reader kindly inform me what is the best and most efficient covering; 2. The best method of attaching same to bamboo poles. Of course, I desire to keep the weight down. Canvas or silk is light, but there is a difficulty of fastening to bamboo poles, besides according to Sir Hiram Maxim's experiments a flexible surface plane is not so efficient as a rigid one. If wood is used, what kind of wood and thickness, also the best liquid or anything else to use for filling up the joinings. The best method of obtaining an arched plane without using a large number of cross-pieces.

Yours truly,

J. M. NUTTALL.

A SUGGESTION TO ADVERTISERS AND OTHER MATTERS.

To the Editor of FLIGHT.

SIR,—I have just received a number of your back numbers of FLIGHT and in looking through them I notice, in your description of the Curtiss biplane, in your issue of July 3rd, that you state that the maximum height of the curvature of the main-plane is about one-ninth of the chord.

The chord is 4 ft. 6 ins. and therefore the maximum camber is 6 ins. Yet in your issue of September 4th you show in the drawing the maximum camber of the main-plane as 3.1 ins. Which is correct?

I wonder if any of your readers who have facilities for getting at accurate records would compare the Az^2 of some of the machines that have flown to date and which have approximately the same angle of entry, trail and of incidence.

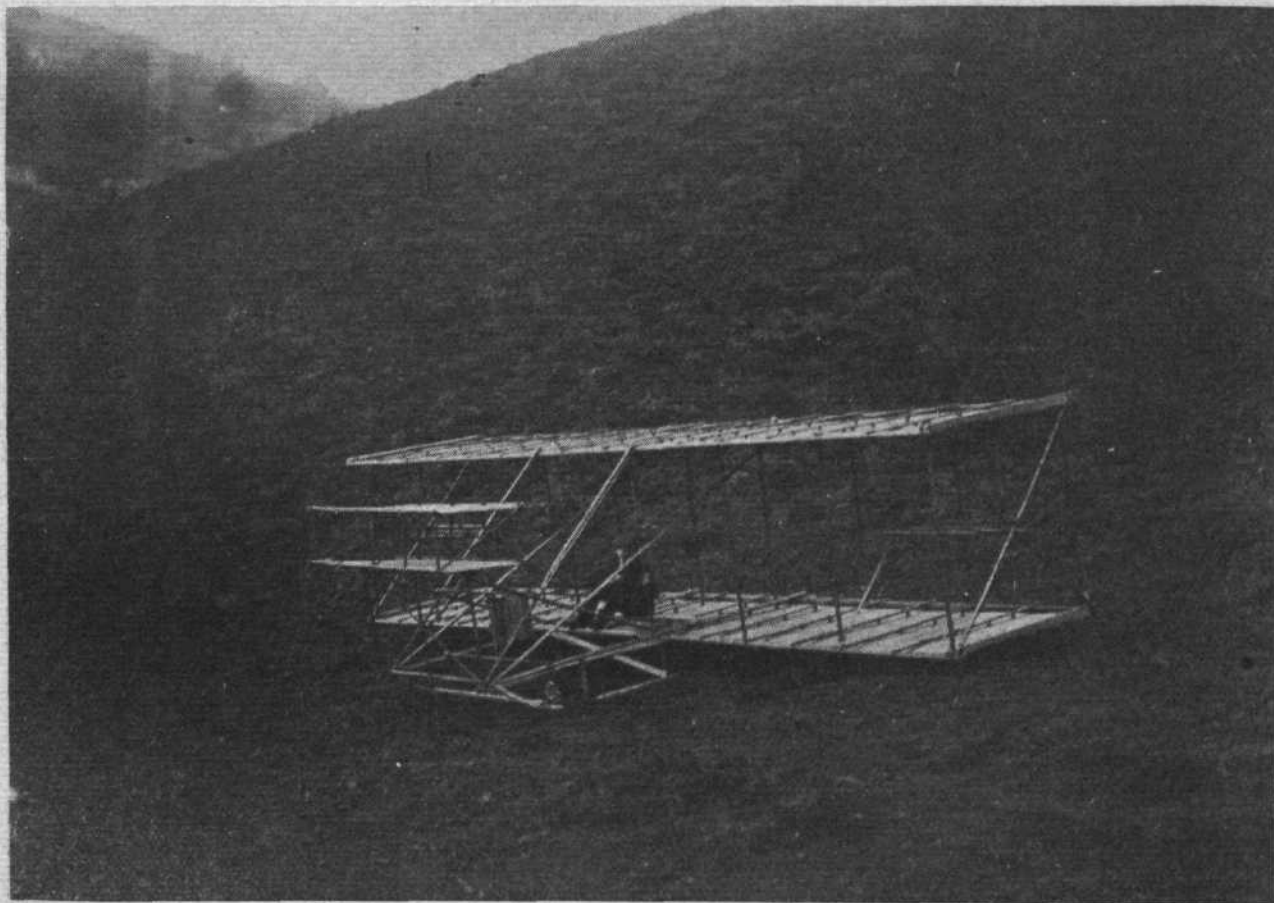
It would tend to show which was the more efficient machine.

Why is it that advertisers in your paper, or any other paper for that matter, never mark the prices against some of their goods? Would it not be very easy for a company advertising engines of different powers to put the approximate price opposite it?

It takes, as you are aware, such a long time to get anything done between this country and home and I know a number of people who are interested in aerial navigation, and it would help us immensely if we get the prices of engines and fittings, &c., roughly from your paper.

I have found it most troublesome to have to write for every detail that I want for my machine, which is being built here.

I was at home some four months ago and saw the Aeroplane



Mr. Hewitt's Glider.

ANOTHER MAN-CARRYING GLIDER.

To the Editor of FLIGHT.

SIR,—I enclose a press plate of a biplane which I have just built, as I thought perhaps you might like to put it in FLIGHT. The machine is 30 ft. long and 6 ft. wide. It has the usual elevators in front and a tail behind, which, however, is not shown in the photograph. Balancing-planes are fitted at each end, and the whole is mounted on wooden runners. At present no engine is fitted, as it is being used as a glider. I have recently ordered a Bleriot monoplane, which is being delivered in January.

Yours faithfully,

V. V. D. HEWITT.

Trefnant, N. Wales.

Exhibition and the exhibits at Shepherd's Bush. I made enquiries at a number of stands for catalogues of accessories, &c., but of course they had none. I gave them my address and they promised to send me these out, but of course I have heard nothing from them.

Are firms in the aeronautical market going to show the same apathy for working up clients outside England as manufacturers of motor cars (in England) have made themselves renowned for?

I beg to remain, Sir, yours truly,

Jubbulpore,
Central Provinces, India.

ALFRED E. JOYCE, B.W.D.,
Assist. Engr.

[With reference to the query *re* the dimensions of the Curtiss flyer, we are endeavouring to get this point settled by the designer.—ED.]

FABRICS WANTED.

To the Editor of FLIGHT.

SIR,—I should be much obliged if you would put the following query in your valuable paper: "I should be obliged for the names of firms manufacturing clothing, 'coats, &c.,' out of vulcanized or oiled silk fabrics to communicate with the address below, and send small sample pieces of fabric in the different shades stocked, and also let me know full particulars as to price, &c. This would much oblige one of your constant readers who has difficulty in getting what he requires."

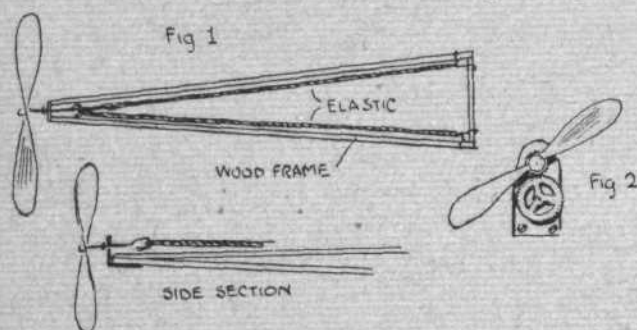
22, Hoole Road, Sheffield.

Yours truly,
HORACE CECIL LAW.

ELASTIC MOTORS.

To the Editor of FLIGHT.

SIR,—Having noticed the difficulty in obtaining a satisfactory elastic motor for models, I enclose a design which may be of interest to those who wish to make models with as little expense as possible.



This sketch will give a good idea of the method of construction. Although it is only a very simple, and quite original idea, I found it to work beyond my expectations. I am thinking of making one with a small gearing arrangement, as in Fig. 2.

Wishing your valuable paper every success.

Yours faithfully,
Askern Spa. C. BELLAMY.

FLYERS AND INTER-CLUB COMPETITIONS.

To the Editor of FLIGHT.

SIR,—Of the many ways in which it is possible for the various clubs and societies devoted to aeronautics to encourage the production and use of first-class British flying machines, let me commend the following:—

Each club should concentrate its energies, mechanical, expert and financial, upon the production of a club aeroplane, and make it the club's representative machine in a great inter-club match next season.

The machine should be designed by a member or members of the competing club. It should be clear of all published patent claims from abroad. It should be entirely British.

Let the clubs foster their own members' ideas, and assist them to patent and construct, after submitting plans to a committee of experts appointed by the club. Other members might advise or submit plans, but let it be done through the committee of experts, pledged to secrecy. The committee's choice to be the club's aeroplane, and the property of the club if they pay for it. The patents to be the inventor's.

When this scheme was outlined before a certain aero club at their general meeting, it was received enthusiastically, and club secretaries might learn the attitude of their committees and make it known in a report to this paper.

Yours faithfully,
Fawley. THEO. OSBORN SMITH.

VARNISH FOR AIR-PROOFING.

To the Editor of FLIGHT.

SIR,—We notice in your issue of December 4th that one of your correspondents, Mr. E. Phillips, of Balham, is asking for a varnish to air-proof calico.

We would recommend the varnish shown in our price list at 1s. per tin, which we are sure would answer his purpose very satisfactorily.

This varnish is not heavy, but is very durable and tough when dry.

Yours faithfully,
THE AUTOMOBILE AND AERIAL SUPPLY CO.
Norwich Union Buildings, St. James's Street, W.

PROPELLER CALCULATIONS.

To the Editor of FLIGHT.

SIR,—Your correspondent must have been misinformed when he was told that a $3\frac{1}{2}$ ft. propeller will give 75 lbs. thrust when driven by a 6-h.p. engine. From experiments I have made I find that it would be impossible to obtain that result from such a small diameter fan. If your correspondent would state the velocity of the air current given off by the propeller it would be a simple matter to estimate the horse-power in the air-current, but this will not exceed 75 per cent. of the power applied to the shaft.

The thrust of a propeller must be caused by the reaction of setting a given weight or number of cubic feet of air in motion, in the same way that the velocity of a falling body is produced by the force of gravity.

To produce a velocity of 35 miles per hour requires a fall of 40 ft., therefore every lb. of air that passes through the propeller must have 40 ft.-lbs. of energy applied to it.

Take the diameter of a fan $3\frac{1}{2}$ ft. = 9.6 sq. ft. area, deduct 33 per cent. for centre, which is not effective, leaves 6.4 sq. ft.

$6.4 \times 51.3 \times .08 \times 40 = 1040$ ft.-lbs. air delivered per second.

$$\frac{1040}{51.3} = 20.0 \text{ lbs. thrust.}$$

App. 3-h.p. net.

Obviously, 35 miles per hour is not sufficient to give the desired thrust. But with a fan of $3\frac{1}{2}$ ft. diameter, giving 6.4 ft. effective area, we shall require a velocity of 66½ miles per hour to produce a thrust of 75 lbs.

Consequently net h.p. will be $\frac{75 \times 66.5 \times 1760 \times 3}{60 \times 33,000} = 13.3$ h.p. and gives h.p., or power applied to the shaft, at 75 per cent. efficiency = 17.7 h.p. to produce a 75 lb. thrust.

With a similar calculation a 6½ ft. diameter fan, with a delivery of 45 miles per hour, will give a thrust of 107 lbs. and require a gross h.p. of 17.1.

I am afraid your correspondent would lead your readers to seriously underestimate the power required to drive a flying machine, and I think if your other correspondents will compare these figures with practical results they will be found to be much nearer the mark.

The formulæ for calculating these results are:—

A = Area sq. ft. covered by propeller in motion.

.08 = Weight cu. ft. air lb.

V = Velocity ft. per sec. of air delivered by fan.

$$\frac{3}{4} A \times .08 \times \frac{V^2}{64.4} = \text{thrust in lbs.}$$

$$\frac{\text{Thrust} \times V \times 32}{9000} = \text{Gross h.p. applied to shaft, assuming 75 per cent. efficiency.}$$

Bucks.

Yours truly,
W. LEA WYNN.

[The above letter in emphasising the law of action and reaction in its application to aerial propulsion, strikes a true note in aerodynamic theory, and should be carefully read by all who wish to study the fascinating problem of propeller design.—ED.]

"SURFACING."

To the Editor of FLIGHT.

SIR,—As a regular subscriber to your invaluable paper I crave space for the insertion of this letter, in search of information.

In model aeroplane making I find it a somewhat difficult task to stretch Japanese silk on the planes, &c.; the majority of my models so covered tend to curl when the adhesive is dry.

Perhaps one of your readers could oblige by explaining a method whereby the silk can be "laid" satisfactorily. Thanking you in anticipation.

Yours faithfully,
Lowestoft. L. E. RICHARDS.

[The stretching and laying of surface material is one of the most awkward jobs associated with the construction of flyers, whether they be models or full-sized machines. We have even heard of a case where it has taken seven men as long as five weeks to cover a monoplane. R. J. Macfie covered his flyer in a day and a half with four men, by using "formers" or shaped frames on which he stretched the Continental fabric in advance. The frames were so built that they could be applied to the machine in such a manner as enabled the fabric to be fastened down while in its stretched condition. Apart from mere convenience of handling, R. J. Macfie claims for his system that it enables the fabric to be stretched evenly, which is the great secret of success.

We hope our readers who have experienced our correspondent's difficulties will offer advice.—ED.]

TOBOGGAN GLIDERS.

To the Editor of FLIGHT.

SIR,—I was much interested in the account of Mr. Vaughan's glider, as I am also making an aeroplane which I mean to try as a glider first. I think the best chance of gliding will be a good fall of snow; my machine will be fitted with skids, and I imagine one could start it like a toboggan down a slope. I also hope it will soar in a stiff breeze, and I imagine it would be much easier to hold it if the ropes were run through pulleys fastened to the ground by stakes and ropes.

Detachable Frames.

The biplane is made in three parts to take to pieces easily. I see you have an illustration of this sent by Mr. Yeatman, which would be quite unsuitable if it is meant for a full-size machine; it would weaken the wood with those bolts, and probably the whole thing would snap off at the joint with the first strain on the machine. Main spars should be joined with steel clamps and screws, the latter through the flanges of steel sockets, and, if necessary, the spars can be lapped round with strong cord also. In the framework, where wire is used, this should also be bound or soldered where it crosses in centre to make a perfectly rigid framework.

Airproof Calico.

E. Phillips wants to know a good varnish to make calico airproof. Two-coat calico with the following mixture after it is stretched on framework: 4 per cent. gelatine and 5 cc. of 10 per cent. formalin (added when gelatine is melted), to 50 cc. This makes the calico waterproof. The formalin makes the gelatine insoluble; probably alum would do as well. For small models ordinary butter paper coated with this is as tight as parchment on a drum, and I have a 6-ft. model covered this way, which has been out in several gales and come in without damage.

Ash v. Spruce.

Your correspondent "F. M." would do better if he used ash instead of spruce for his spars, but the best spruce is Oregon. Ash spars 10 ft. long, $1\frac{1}{2}$ by 1 in., weigh about 5 lbs. each; and for a machine weighing about 600 lbs. ash spars of $1\frac{1}{2}$ by 2 in. are used. Hoping this information may be of use.

Belfast.

Yours truly,

LILIAN E. BLAND.

[It is at all times a pleasure to us to receive such a thoroughly helpful letter as the above, and the fact that it comes from a lady not only enhances the interest which attaches to it, but shows how far-reaching is the fascination of flight. We expect much from Ireland in aviation, as in every other phase of daring sport, and we cordially wish success to our correspondent.—Ed.]

CORD AND BAMBOO.

To the Editor of FLIGHT.

SIR,—I should like to help your correspondents "M. J. Carroll" and "F. M.", who write in your issue of December 4th.

For the control of large kites I think he would find hollow brass rings lashed to his main cable at certain distances, say every 3 yards, through which are rove the guy ropes for controlling the angle of the kite, will obviate the twisting of the cords, at the same time keeping them together. He would do well to buy his rope stretched and the "turn" taken out of it by the ropemakers. The alternative is plaited flax line, but this is more expensive.

To pierce a long bamboo from end to end, take a straight piece of metal rod the size of the hole required and, say, 4 ft. long. Drive this in the top end, and then set the pole on end and jar it on something solid, keeping the pole as upright as possible. The rod will make its way down and pierce a straight hole. Remove the rod and jar out the chips. This plan will answer for the ordinary mottled and yellow bamboos; the tonkings must be bored out.

Reverting to M. J. Carroll's query, I would advise him to beware of "clothes line," and get his cordage from a reliable yacht chandler's. Get samples of "Hambro line" and "lacing." Attach the carrying chair to the second ring—an extra strong one—on the main cable.

Faithfully yours,

T. OSBORN SMITH.

Fawley.

FARMAN DETAILS.

To the Editor of FLIGHT.

SIR,—I am building a model Farman biplane, scale 1 in. to 1 ft. I should feel much obliged if you would let me know the following:—

1. How the tail is attached to the outrigger. Do the spars go right to the end of the tail?
2. With reference to the main planes: α , angle of entry; β , angle of trail; γ , camber; δ , angle of incidence.

The drawings of Farman's machine are in No. 42, October 16th, pp. 641—644.

Bromsgrove.

Yours faithfully,

H. C. CUTLER.

[The outrigger spars stop short at the front transverse spars of the tail, the former being made by aluminium socket-brackets, as elsewhere throughout the machine. The tail is therefore "overhung," but it is, of course, braced by the diagonal wires which cause it to become integral with the outrigger frame. Unfortunately, we are unable at present to give answers to the second question.—Ed.]

"TORQUE."

To the Editor of FLIGHT.

SIR,—I should be very glad of your advice on the following point. In designing a small model monoplane on the general lines of an Antoinette, what points should be borne in mind to avoid the torque produced by a single elastic-driven tractor screw? In particular does (1) the pitch, (2) the size, (3) the speed of revolution of the screw affect matters?

Also am I right in supposing that the elastic and the screw each have a separate torque of their own on the machine?

I enclose a stamp for reply. Thanking you in advance.

Yours faithfully,

South Croydon.

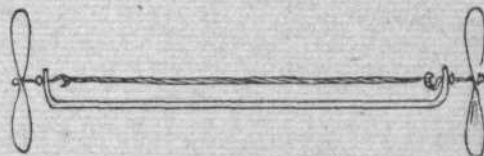
C. A. R.

[Torque being essential to the transmission of power (it is merely a technical expression for the word "twist") cannot be avoided in any system in which power is transmitted by rotary motion, although its ill-effects in particular cases may be eliminated by special precautions.

For instance, the objection to the torque of the drive on a model flyer is that its reaction tends to cant the machine, and thus makes it follow a curved path. This effect of torque reaction can be neutralised by fitting twin propellers revolving in opposite directions. It can also be compensated for, within reason, by adjusting the wing tips of the planes so as to give a correcting effect such as will constantly steer the machine straight. This, however, is only a makeshift, and impairs the full flying capabilities of the machine.

The torque of the elastic and of the propeller cannot very well be considered apart. It is the system as a whole which produces the torque, and the torque itself is only rendered evident—in fact can only exist—because of the abutments at each end of the propelling mechanism. Thus the abutment for the elastic is the frame of the flyer, while the abutment for the propeller is the air. The torque of the elastic is expended in overcoming the resistance of forcing the blades of the propeller through the air, and from Newton's law, "action and reaction are equal and opposite" it follows that whatever torque is exerted in actually driving the screw must also be exerted as reaction in a contrary direction as a tendency to cant the flyer. But for the fact that the wings of the flyer act as huge paddles of great resistance, the machine would revolve about its axis as the result of this torque.

A simple experiment may help to fix ideas on this subject. Mount two similar propellers on opposite ends of a piece of elastic,



and wind up the elastic in the usual way. Arrange a little frame so that the propellers are suitably held apart with the elastic between them (see sketch). When the elastic is wound up, let go both propellers simultaneously; they will revolve in opposite directions but at equal speeds. Again wind up the elastic and let go one propeller only; it will revolve in the same direction as before but twice as fast. Substitute some kind of paddle for the propeller at one end of the elastic, and again let go both simultaneously; the paddle will revolve in the opposite direction to the propeller, but at a slower speed. If the paddle is made large enough in proportion to the propeller, it will not revolve at all, but merely cant over a little during such time as the propeller is revolving. This is the state of affairs which is reached in the case of the flying machine.—Ed.]

BOOKS ON MODEL MAKING.

To the Editor of FLIGHT.

SIR,—In answer to your two correspondents, "Gravity" and "Pressure," in the issue of December 4th, I recommend a very

interesting book, "Model Flying Machines; Their Design and Construction," by W. G. Aston. I think your correspondents will find adequate answers there. It explains some excellent elastic motors of great power and durability. I have made a great many models, but have been handicapped by the want of a good reliable motor, but on the one I am now engaged (a Wright biplane) I am using one of these elastic motors. I tried the works of a gramophone on two of my models, and got a good deal of power from it.

Hoping you will find room for this in your excellent paper.

Yours faithfully,

Sherborne.

FLYING MACHINE.

To the Editor of FLIGHT.

SIR,—I shall be greatly obliged if you can inform me if there are any books published on model aeroplane building, at 2s. 6d. or thereabouts, also if there are any clubs or societies in the West End of model builders. Trusting I am not giving you too much trouble, and will accept my best wishes for a long and successful life of your most interesting paper.

Yours truly,

G. PACE.

Golden Square.

In addition to the little book mentioned in the above letter from "Flying Machine," we would also suggest E. W. Twining's pamphlet and drawings. We shall be pleased to obtain copies of these or any other books for readers who require them.—ED.]

CORD FOR LARGE KITES.

To the Editor of FLIGHT.

SIR,—In reply to M. J. Carroll in respect to kite cords, I find that Messrs. A. W. Gamage, Holborn, London, E.C., stock the following sizes:—

	Breaking Strain.	Length per lb.	Price per 300 yards.	Carriage.
	lbs.	yards.	s. d.	s. d.
1	105	150	5 0	0 5
2	160	100	7 6	0 6
3	264	75	10 0	0 7
4	460	37	20 0	0 11
5	800	21	42 0	1 0

Yours truly,

H. ROBINSON.

New Brighton.

VARNISHED FABRIC.

To the Editor of FLIGHT.

SIR,—We note in the correspondence in your issue of the 4th inst. that Mr. E. Phillips is asking for a varnish for glazing ordinary calico without increasing the weight appreciably, and we think that he could not do better than use our special aeroplane varnish, which besides making the calico air-tight, is also waterproof, and it has given great satisfaction in this way.

Yours faithfully,

H. ROBINSON,

General Manager.

144, Queen Victoria Street, E.C.

ANSWERS TO CORRESPONDENTS.

F. C. BRADBEER.—In reply to your query, special covers will be available for binding Vol. I of FLIGHT immediately after the end of the year, and an index will be issued separately for those wishing to bind up their parts.



NEW COMPANY REGISTERED.

Private Company.

Premier Aeroplane Manufacturing Co., Ltd., 6A, Tudor Street, Temple, E.C.—Capital £1,000 (990 £1 preferred and 200 1s. deferred shares).



PUBLICATIONS RECEIVED.

The Motorist's and Aviator's Year-Book and Diary, 1910. London: E. J. Larby, 1, Paternoster Row, E.C. Price 2s. net.

Aeroplane of A. L. Rogestvinsky's System. Moscow: A. Rogestvinsky, 8, Ostogenka Street.

Catalogue.

The Aeroplane Annual. The Aeroplane Supply Co., 110-111, Piccadilly, W.

Aeronautical Patents Published.

Applied for in 1908.

Published December 2nd, 1909.

- 24,344. W. H. FAUBER. Aeroplanes.
24,617. G. A. PEACHE. Flying machines.
24,738. A. A. FASE. Aerial transport apparatus for amusement purposes.
26,827. SIR C. S. FORBES. Level-maintaining devices for aeroplanes.

Published December 9th, 1909.

- 24,441. J. W. CLOUD. Aerial machines.

Applied for in 1909.

Published December 2nd, 1909.

750. A. V. ROE. Flying machines.
1,656. A. WORSWICK. Balancing and steering aeroplanes.
22,042. E. SURCOUF. Steadying means for airships.

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